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ABEJA AFRICANIZADA  
(*Apis mellifera adansonii*)  
bibliografía parcialmente anotada

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**ABEJA AFRICANIZADA**  
*(Apis mellifera adansonii)*

**bibliografía parcialmente anotada**

**Compilada por:**

*Mayela Orozco de Yee*  
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**Centro Interamericano de Documentación e Información Agrícola-CIDIA**  
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DIA-129 Orozco de Yee, Mayela

Abeja africanizada (Apis mellifera adansonii)  
: bibliografía parcialmente anotada / compilada  
por Mayela Orozco de Yee; Ana María Arias de Guerrero. -- Turrialba, Costa Rica : Centro Interamericano de Documentación e Información Agrícola. Biblioteca Comemorativa Orton, 1984.

86 p. ; 28 cm. -- (Serie Documentación e Información Agrícola / Instituto Interamericano de Cooperación para la Agricultura, ISSN 0301-438X ; no. 129)

1. Abeja africanizada - Bibliografía I. Arias de Guerrero, Ana María, comp. II. IICA-CIDIA III. Título IV. Serie

Dewey 638.12016



AGRINTER L00 7110

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## INTRODUCCION

Han transcurrido 27 años desde que en Brasil se escaparon algunas reinas de "abejas africanas", las que rápidamente se adaptaron al país cruzándose con las abejas europeas ya existentes y avanzando a una velocidad aproximada de 300 km anuales, en su permanente desplazamiento hacia el norte.

Al cruzarse con las europeas la abeja africana se convirtió en lo que hoy se llama "Abeja Africanizada" que presenta ciertas situaciones indeseables, como son los frecuentes accidentes derivados de sus ataques masivos, lo que origina pérdidas de animales e incluso, muertes de seres humanos. Por su culpa también ha habido abandono de actividades apícolas, lo que repercute negativamente en la producción.

La abeja africana llegó a Brasil desde Africa y de allí al resto de América. Es posible que alrededor de 1990, o antes, esté arribando a los Estados Unidos de América. Muy significativo es el hecho de que se han venido cumpliendo estas predicciones pues a Costa Rica llegó a principio de 1983, como fue previsto.

*Importancia de la abeja africanizada en la apicultura.*- México, Centroamérica y Panamá, para mencionar sólo una área, tienen alrededor de 2 778 000 colmenas que producen aproximadamente 72 800 toneladas de miel, a lo que debe sumarse la producción de cera, polen, jalea real y otros. Este cuadro económico podría incrementarse en el futuro. Además la apicultura es generadora de fuentes de trabajo, divisas y alimentos. No podría decirse que la abeja africanizada es agresiva. Es más bien altamente sensible a los estímulos externos, más si son violentos, ante los cuales se torna defensiva y es cuando ataca, para defenderse de algo que considera ser una agresión.

Dado el significado económico de la abeja africanizada, el PROGRAMA DE SANIDAD VEGETAL del IICA, ha considerado importante publicar la presente Bibliografía, con la esperanza de que sea un instrumento útil para propiciar y mejorar la apicultura de América.

Ing. Evaristo Morales  
Entomólogo - OIRSA  
San José, COSTA RICA





## METODOLOGIA

La información registrada en esta **Bibliografía sobre Abeja Africanizada** (*Apis mellifera adansonii*) es el resultado de una búsqueda retrospectiva hasta el año 1960 realizada en las siguientes fuentes bibliográficas disponibles en la Biblioteca Conmemorativa Orton, Biblioteca Nacional de Costa Rica, Biblioteca de la Universidad de Costa Rica y Centro Regional Universitario del Atlántico:

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- Bibliography of Agriculture
- Entomology Abstracts
- Forestry Abstracts
- Índice Agrícola de América Latina y el Caribe
- Review of Applied Entomology. Series A & B
- Veterinary Bulletin

Además, se revisó catálogos de libros, folletos y recortes de prensa de las bibliotecas antes mencionadas.

Para facilitar el uso de la información registrada, se incluye resúmenes de los trabajos que se han publicado sobre el tema. Los resúmenes suministrados son de tres tipos: a) preparados por el autor y tomados directamente de los propios documentos; b) de los repertorios bibliográficos analizados, con la indicación del volumen y número de la referencia; c) elaborados por los compiladores de la presente bibliografía.

La bibliografía se encuentra ordenada alfabéticamente por autor o título y numerada consecutivamente del 1 al 505. Para facilitar la identificación de los documentos se elaboró un Índice de Autores.

Las referencias bibliográficas de los trabajos señalados con asterisco (\*), indican la disponibilidad de los documentos en la Biblioteca Conmemorativa Orton, a los cuales se puede tener acceso mediante el servicio de Reproducción de Documentos del CIDIA.

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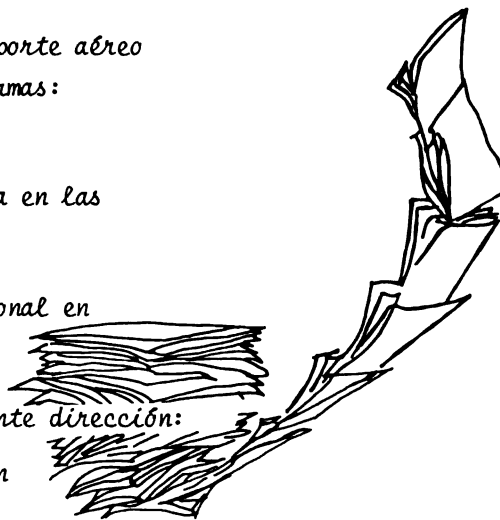
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ABEJA AFRICANIZADA  
(Apis mellifera adansonii)

\* LA ABEJA AFRICANIZADA. (Apis mellifera adansonii) (Carter, 1903). *Revista de Apicultura y Zootecnia*, México, México, 1903, 1: 1-12. (1903)

Se describe y se ilustra la abeja africana, la abeja africanizada, y se da a conocer sus características, su comportamiento, su modo de vivir y de trabajar.

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\* "ABEJA AFRICANA" (Apis mellifera adansonii) (Carter, 1903). (1903)

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ABELA AFRICANIZADA  
(apis mellifera adansonii)

ABEJA AFRICANIZADA  
(*Apis mellifera adansonii*)

- \* LA ABEJA africana: lo que usted debe saber. Costa Rica. Ministerio de Agricultura y Ganadería. Boletín divulgativo no. 77. 1982. 9 p. (001)
- Se suministra información breve y divulgativa sobre la abeja africana, sus características, comportamiento, manejo del apiario y de la colmena.
- \* LA ABEJA africanizada. La Nación, San José; Dic. 28, 1982:2C. (002)
- En este artículo se señala cómo es la abeja africanizada, cómo se comporta, dónde coloca el apiario, qué equipo se utiliza, medidas de protección y manejo de la colmena.
- \* ABEJA AFRICANIZADA está en Costa Rica. La República, San José; Abril 22, 1983:4. (003)
- Se informa que especialistas y autoridades de la Universidad de Costa Rica, Universidad Nacional, Ministerio de Agricultura y Ganadería, y Universidad de Kansas, confirmaron que un enjambre encontrado en Pérez Zeledón, Costa Rica, es de abejas africanizadas y se asegura que están en el país desde diciembre de 1982.
- También se manifiesta que el veneno de estas abejas es igual al de las abejas corrientes, produciendo reacciones alérgicas a personas susceptibles. Se presentan breves explicaciones sobre medidas a tomar en caso de picaduras.
- \* ABEJA AFRICANIZADA se acerca al Valle Central. La Nación, San José; Febrero 8, 1984:4A. (004)
- Se confirma la presencia de la abeja africana al Valle Central de Costa Rica y se ofrecen recomendaciones sobre la forma de actuar ante la presencia de estos insectos.
- Se comunica que el Gobierno Nacional ha autorizado al Ministerio de Agricultura y Ganadería, destruir sin indemnización alguna aquellos enjambres, colmenas o colonias que se consideren peligrosos para la salud pública o los intereses económicos de los apicultores.
- \* ABEJA AFRICANIZADA, su distribución en el país. La Nación, San José; Abril 3, 1984:1C. (005)
- Se señala los sitios invadidos por la abeja africanizada en Costa Rica a partir de 1982 y se informa sobre las características y forma de proceder ante la presencia de esta abeja.
- \* LA ABEJA asesina amenaza nuestro país. La República, San José; Enero 27, 1980:12. (006)
- El presente artículo brinda información sobre la posible dispersión de la "abeja africanizada" en las Américas y el avance anual de este insecto desde el año 1957 hasta 1979 en Colombia y Barbados. Da detalles sobre sus características y agresividad.
- \* "ABEJA ASESINA" está a las puertas del país. La Nación, San José; Dic. 14, 1982:10A. (007)
- Se suministra la siguiente información sobre la abeja africanizada: ataca solamente cuando se le molesta, tiene una gran capacidad de reproducción y de producción de miel, la cual decrece en la etapa inicial registrándose un incremento cuando existe un manejo adecuado.

- \* LA ABEJA asesina toca a la puerta. La Nación, San José; Mayo 17, 1979:7C. (008)
- Se informa sobre la inevitable llegada de la "abeja africanizada" a Centro América, en un lapso de 1 o 2 años. Se afirma que esta abeja es más agresiva y productiva que las abejas locales y ataca solamente para defenderse y cuando es molestada. Se suministra detalles sobre su historia y expansión a través del continente americano.
- LA ABEJA no es asesina. Caracas, Ministerio de Agricultura y Cría, 1976. 5 p. (009)
- \* ABEJAS AFRICANAS. Cotar (Argentina) 19(116):45-46. 1974. (010)
- Breve información sobre las cualidades favorables y desfavorables de la abeja africanizada y medidas a tomar ante la presencia de este insecto.
- \* LAS ABEJAS africanas. Gaceta Agrícola (México) 20(530):18. 1976. (011)
- Se presenta un relato sobre la diseminación de la abeja africanizada desde Brasil a los países vecinos, medidas de control de las colmenas y su manejo.
- \* ABEJAS "ASESINAS" causan primeros daños en el país. La Nación, San José; Nov. 26, 1983:4A. (012)
- Miembros de la Comisión Nacional de Apicultura, informaron que en la zona sur de Costa Rica, la abeja "asesina" ha causado los primeros daños, corroborando su presencia en Parrita, Quepos, Pérez Zeledón y Caldera. Se hace relación al documento del OIRSA que contiene un programa para la prevención, manejo y control de la abeja, así como pasos y estrategias a seguir durante la campaña que se va a emprender contra este insecto.
- \* LAS ABEJAS asesinas del Brasil. La Prensa Libre, San José; Oct. 6, 1977:2. (013)
- Este documento trata sobre la historia de la abeja africanizada en Brasil desde su traída del Africa hasta que escaparon de un apiario en 1957. Incluye datos sobre su agresividad.
- \* "ABEJAS ASESINAS" llegaron a Caracas. La Nación, San José; Feb. 18, 1982:31A. (014)
- Breve noticia sobre la confirmación de la llegada de las abejas africanizadas a Venezuela, y de las recomendaciones a seguir por la población en general ante la amenaza de su presencia.
- ABELHAS AFRICANAS matam homens e animais e acabam com pequenos apiarios domésticos. Agricultura e Pecuaria (Brasil) 38(517):30-33. 1967. (015)
- ABELHAS AFRICANAS - nem benção nem maldição. Correio Agro-Pecuário (Brasil) 8(142):16-17. 1968. (016)
- THE AFRICAN bee. Gleanings in Bee Culture 99(5):185. 1971. (017)
- THE AFRICAN bee - early introductions to Europe and America. Gleanings in Bee Culture 103(8): 273. 1975. (018)

- \* AFRICAN BEES. *American Bee Journal* 112(5):182. 1972. (019)
- \* AFRICAN BEES in Africa. *Gleanings in Bee Culture* 106(5):229. 1978. (020)
- Revisión del artículo de D.J.C. Fletcher, "*Apis mellifera adansonii* in Africa" publicado en *Annual Review of Entomology* 23:151-171. 1978. Describe las características de la abeja, su producción de miel, enemigos y conducta.
- AFRICAN BEES in Africa. *Bee World* 59(3):116-117. 1978. (021)
- AFRICAN BEES in Brazil and unexpected high honey yields in South America. *Bee World* 47(3):90. 1966. (022)
- "AFRICANAS" EN Pergamino. *Gaceta del Colmenar* 34(382):47-48. 1972. (023)
- THE "AFRICANIZED" honey bee. *California Farmer (Cent Ed)* 248(4):15-16. 1978. (024)
- THE AFRICANIZED honey bee. USDA. Agriculture Fact Sheet no. 7-5-1. 1979. 4 p. (025)
- \* AFRICANIZED HONEY bee to be given four-year study. *American Bee Journal* 114(11):424. 1974. (026)
- \* AGUILAR, V. Presencia de la abeja africanizada en Costa Rica no debe alarmar. *La República*, San José; Oct. 14, 1982:12. (027)
- Se suministra información sobre la presencia de la abeja asesina en Centro América, con mapas indicando las posibles rutas del paso de la abeja africanizada por el Istmo y los años en que llegará a cada uno de estos países, incluyendo México. En Costa Rica, la ruta estimada será la costa del Océano Pacífico y su fecha de llegada se calcula a principios de 1983.
- ALBER, M. World-wide apiculture at the turning point (En alemán). I. [*Apis mellifera adansonii*, Africa, Brazil]. *Biene* 111(4):108-110. 1975. (028)
- \_\_\_\_\_. World apiculture at the turning point (En alemán). II. *Biene* 111(5):140-143. 1975. (029)
- Incluye *Apis mellifera adansonii*.
- \* ALERTAN CONTRA cualquier tipo de enjambre. *La Nación*, San José; Dic. 20, 1983:7C. (030)
- Técnicos de la Comisión Nacional Apícola de Costa Rica advierten a la población en general sobre la presencia de cualquier tipo de enjambre que localicen, con el fin de que las personas capacitadas brinden ayuda para su exterminio. Se ofrecen algunas recomendaciones a seguir ante ataque de abejas africanizadas.
- ALEXANDER, G. About those killer bees. *International Wildlife* 5(5):36-39. 1975. (031)
- Incluye abeja africanizada.

- \* ALGUNOS DATOS sobre la abeja africanizada. La Nación, San José; Abril 19, 1983:8C. (032)

Se suministran datos breves sobre las características físicas, comportamiento de la *Apis mellifera adansonii* y expansión a lo largo del continente americano.

- \* ALVAREZ RIZZATI, A. La realidad sobre la abeja africanizada. La Nación, San José; Junio 7, 1983:1C. (033)

Se informa sobre el comportamiento de la abeja africanizada y aclara conceptos erróneos y alarmantes sobre su agresividad con la finalidad de que los apicultores costarricenses no teman convivir con ella, sino aprender mejores técnicas para la explotación y manejo de apiarios ya instalados.

- AMARAL, E., BOTELHO, P.S.M. y SILVEIRA NETO, S. Ação de diferentes lampadas na atração de abelhas híbridas das subespécies: *Apis mellifera adansonii* e *Apis mellifera ligustica*. In Congresso Brasileiro de Apicultura, 3°, Piracicaba, SP, Brasil, 1974. Anais. Ed. por L.S. Gonçalves. Ribeirão Preto, SP, Brasil, Dept. Genética, Fac. Medicina, 1975. pp. 153-159. (034)

*Apis mellifera adansonii* x *Apis mellifera ligustica* hybrids that had been enclosed in a hexagonal apparatus were able to leave it by any one of six tubes. The tubes opened into plastic containers exposed to light from a fluorescent bulb. Each bulb was placed in each position in turn. Ultraviolet (BL), ultraviolet (BLB), pink, green, daylight and blue bulbs attracted totals of 1523, 1488, 176, 149, 80 and 55 bees, respectively. The difference between ultraviolet and the other colours was significant. (Apicultural Abstracts 28(4):1191. 1977).

- "ANAESTHETIZING AFRICAN bee". Bee World 50(4):125. 1969. (035)

- \* ANALIZAN APICULTURA mundial. La Nación, San José; Feb. 10, 1982:1C. (036)

Se provee información sobre el 28° Congreso Mundial de Apicultura celebrado en Acapulco, México.

En relación a la abeja africanizada, el representante de Costa Rica en el congreso manifestó que se evidenció la falta de información nueva sobre el tema a pesar de su próximo avance en Panamá y Costa Rica, para luego extenderse hasta la América del Norte.

En APIMONDIA, se dijo que la abeja africanizada constituye un peligro para la apicultura costarricense, pues como ha sucedido en los países afectados, cambiará totalmente la práctica que se sigue actualmente.

- ANGEBY, O. Biodling i Gambia. Beekeeping in Gambia. Bitidningen 80(6):191-195. 1981. (037)

with *Apis mellifera adansonii*.

- \* EL AÑO entrante en Costa Rica: se aproxima la "abeja asesina". Extra Cancha, San José; Nov. 24, 1980:2. (038)

Se suministra información sobre la diseminación de la abeja africanizada en el Istmo Centroamericano, incluyendo historia de esta abeja desde su punto de origen en Brasil.



- \* APICULTORES APRENDEN a trabajar con abejas africanizadas. La Prensa Libre, San José; Dic. 10, 1982:18. (039)

También en: Aseguran que "abeja asesina" llegará a más tardar en octubre. La Nación, San José; Nov. 11, 1982:6A.

Se informa sobre las recomendaciones ofrecidas por el Dr. Gard W. Otis de la Universidad de Guelph, Canadá, a los apicultores costarricenses sobre la conveniencia de aprender a trabajar con la abeja africanizada y aprovechar la llegada de los primeros enjambres. Se indicará además los problemas a los cuales deben enfrentarse ante la llegada del insecto.

- APICULTURA: EL problema de las "africanas". Agro Nuestr. (Argentina) 14(140):58-60. 1972. (040)

- \* APROBARON PLAN conjunto sobre abeja africanizada. La Nación, San José; Julio 26, 1983:4C. (041)

Se menciona las gestiones realizadas por el OIRSA junto con los Ministerios de Agricultura de los países miembros de América Central para que la apicultura sea declarada en estado de emergencia nacional y sobre la solicitud presentada a organismos como el USDA, FAO, IICA, BID y BCIE, para desarrollar el plan que consta de 4 etapas prioritarias: 1) Identificación, dispersión y cuarentena; 2) Establecimiento de una zona de control de la abeja africanizada en Costa Rica; 3) Capacitación; y 4) Divulgación e investigación.

Para iniciar este plan, el Departamento de Agricultura de los Estados Unidos aportó la suma de US\$25,000 y el OIRSA US\$5,000 así como equipo y materiales necesarios.

- ARAUJO, V. DE P. Apiários e técnica apícola africana. s.l., s.e., 1960. 15 p. (042)

\_\_\_\_\_. The central African bee in South America. Bee World 52(3):116-121. 1971. (043)

- \* EN ARGENTINA, contralor de la abeja africana y sus cruzamientos. Apiacta 10(2):91. 1975. (044)

- \* También en inglés.

Se transcribe la Ley No. 20739 sancionada el 4 de setiembre de 1974 y promulgada el 23 de setiembre de 1974 por el Gobierno Argentino, referente a la abeja africana (*Apis mellifera adansonii* Latr.).

- \* ASEGURAN QUE "abeja asesina" llegará a más tardar en octubre. La Nación, San José; Nov. 11, 1982:6A. (045)

El Dr. Gard W. Otis de la Universidad de Guelph, Canadá, se reunió con apicultores de Orotina, San Mateo y Esparza, con el objeto de ponerlos al tanto de la llegada de ese insecto y prepararlos para que se acostumbren a vivir con ellos. Enfatizó sobre su comportamiento, recomendaciones y el uso necesario de vestimenta apropiada.

- ATTEMPTS TO obtain mating of honeybees in confinement. Bee World 53(2):60-63. 1972. (046)

- \* AVOIDANCE AND repellency. In Stephen, W.P., Bohart, G.E. y Torchio, P.F. The biology and external morphology of bees: with a synopsis of the genera of Northwestern America. Corvallis, Oregon State University, Agricultural Experiment Station, 1969. pp. 129-130. (047)

Incluye *Apis mellifera adansonii*.

- \* BARTOLOME, R.A. Impresiones de una visita a una zona africanizada del norte argentino. Ciencia y Abejas (Argentina) 6(22):52-55. 1980. (048)

El autor expone y sustenta la opinión de que la agresividad de la abeja se debe a no haber practicado un manejo racional ni haber usado la colmena apropiada.

- \* BATISTA, G.C. DE., AMARAL, A. y PASSARELLA NETO, A. Toxicidade de alguns inseticidas e acaricida para operárias híbridas de *Apis mellifera ligustica* L. e *Apis mellifera adansonii* L. (Hymenoptera, Apidae). Anais da Sociedade Entomológica do Brasil 4(1):73-77. 1975. (049)

También en: Congresso Brasileiro de Apicultura, 3°, Piracicaba, SP, Brasil, 1974. Anais. Ed. por L.S. Gonçalves. Ribeirão, Preto, SP, Brasil, Dept. Genética., Fac. Medicina, 1975. pp. 215-222.

This paper deals with laboratory toxicity studies of seventeen organophosphorus and one carbamate insecticides, and one acaricide to hybrid workers of *Apis mellifera ligustica* L. (Italian bees) and *Apis mellifera adansonii* (African bees) in Southern Brazil.

The values of L.D.<sub>50</sub> (ug/bee) and the slopes of the dose X mortality curves are, respectively: diazinon .140, 6.566; parathion .082, 14.097; methyl parathion .061, 7.509; ethion 1.624; 2.288; dichlorvos .029, 3.162; monocrotophos .085, 6.170; malathion .181, 18.852; trichlorfon 2.393, 2.964; phosphamidon .075, 2.330; disulfoton 1.464, 3.976; phenthoate .050, 5.085; dicrotophos .041, 13.667; phorate .091, 8.848; chlorfenvinphos .408, 2.816; carbo-phenothion .677, 5.050; mevinphos .025, 9.184; Gardona .223, 5.942; carbaryl .124, 3.336; chlorphenamidine 9.157, 3.215.

With exception of trichlorfon and chlorphenamidine, which were moderately toxic, all pesticides were found highly toxic to the hybrids.

The data showed that the Brazilian hybrids are more sensitive than Californian bees. No available data were found by the authors for comparisons with phenthoate and chlorphenomidine values.

- \* \_\_\_\_\_, DIAS, E. DE A. y AMARAL, E. Variação do índice de senegismo da mistura de carbaryl com butóxido de piperonila em proporções variadas para operárias de abelhas. Anais da Sociedade Entomológica do Brasil 5(1):69-73. 1976. (050)

Laboratory experiments were carried out to investigate the synergistic action of piperonyl butoxide on carbaryl in varied proportion to hybrid workers of *Apis mellifera ligustica* (Italian bees) x *A. m. adansonii* (African bees) (Hym., Apidae). After being anesthetized with CO<sub>2</sub> the bees were topically treated on the pronotum with known amounts of mixtures of the insecticide (carbaryl) plus the synergistic (piperonyl butoxide) in acetone solutions, with the aid of a micro-syringe adapted to a micrometer. Each mixture, in varied proportions of the products, was applied in at least six different concentrations of the

insecticide (treatments), in order to give mortalities ranging 0 to 100% in 24 h. The treatments were replicated twice, with twenty insects treated in each replication. There was also a check treatment in which the insects were treated with pure acetone. Initially the LD<sub>50</sub> value was determined for carbaryl alone; the values for the mixture were calculated for the following varied proportions: 1000:1, 100:1, 10:1, 5:1, 1:1, 1:2, 1:5, 1:10 and 1:100 w/w carbaryl: piperonyl butoxide respectively. The synergism ratio (S.R.) in each case, was calculated taking the quotient between LD<sub>50</sub> for carbaryl alone (numerator), and LD<sub>50</sub> for the considered mixture denominator. The synergism ratio increased with the increase of the concentration of the synergistic compound in relation to the toxic one, being progressively increased from 1:12 up to 3.13 in the range tested. This S.R. crescent trend may be explained by the more effective blockade that higher concentrations of the synergist causes on the insect's detoxification mechanism. (Entomology Abstracts 10(3):1714. 1979).

BEETSMA, J. De huidige stand van de bijenteelt in Surinam. /Present state of bee-keeping in Surinam/. Informatietijdschrift over Ontwikkelingsvraagstukken van Suriname 2(2): 33-34. 1977. (051)

The Brazilian bee, a crossing between the Italian and African bee, has already invaded bee colonies in Surinam. The Brazilian bee is very aggressive but it is also a good honey producer. If acting carefully and replacing queens of aggressive colonies by more gentle queens, the Brazilian bee need not jeopardize bee-keeping in Surinam. (Abstracts of Tropical Agriculture 4(1):19984. 1978).

BIERZYCHUDEK, A. et al. Search for historical data on the existence of *Apis mellifera* in a section of South America. Gaceta del Colmenar (Argentina) 36(10):310, 312-313. 1974. (052)

BIJOS, J.R. African bee-apiculture's terror. Bee Genet. Sel. Reprod. 1976:146-147. 1976. (053)

\* BIOLOGIA DE la abeja africanizada. Ciencia y Abejas (Argentina) 6(22):15-16. 1980. (054)

Se estudió 12 colonias con abejas africanizadas, divididas en 3 grupos, con colonias de 1, 2 y 3 nidos. Se obtuvo datos sobre crías, polen, miel, huevos, cría muerta y área vacía, además de variables climáticas analizadas en otros trabajos, peso de las colonias y fases lunares. Este trabajo se desarrolló en Recife, Brasil, en el Laboratorio Apícola del Departamento de Zootecnia de la U.F.R.P.

BOGGINO, P.A. Consideraciones sobre apicultura y la abeja africana en el Paraguay. Gaceta del Colmenar (Argentina) 31(349):137-138. 1969. (055)

\_\_\_\_\_. Verdades sobre la abeja africana. Gaceta del Colmenar (Argentina) 1971. (056)

\_\_\_\_\_. African bees; the present beekeeping situation in Paraguay. American Bee Journal 112(9):341. 1972. (057)

\_\_\_\_\_. Africanas: problema americano. Gaceta del Colmenar (Argentina) 34(387):200-201. 1972. (058)

- BOIREAU, C.F. La abeja africana, el vándalo de América. Gaceta del Colmenar (Argentina) 36(10):335-336. 1974. (059)
- \_\_\_\_\_. With regard to Africanized honeybees. Gaceta del Colmenar (Argentina) 39(10):418-422. 1977. (060)
- BORNECK, R. Reflections on problem of Apis adansonii. Revue Francaise Apicole 309:228-229. 1973. (061)
- \* BOTHA, J.J.C. My experience with *Apis mellifera adansonii*, native bee of South Africa. Gleanings in Bee Culture 94(3):167, 179. 1966. (062)
- \* BRANCH, T.W. African bee in Rhodesia. American Bee Journal 111(9):353. 1971. (063)
- \* BRANDEBURGO, L.S., GONÇALVES, L.S. y KERR, W.E. Nota sobre o estudo do efeito das condições climáticas sobre a agressividade das abelhas africanizadas. In Sociedade Brasileira para o Progresso da Ciência. Reunião Anual, 28., Brasília, DF, 1976. Resumos. Ciência e Cultura (Brasil) Suppl. 28(7):276-277. 1976. (064)

A agressividade das abelhas *Apis mellifera* é controlada por oito a onze genes recessivos (Stort 1971, Kerr 1974) porém este comportamento parece estar influenciado por condições ambientais (temperatura, umidade, odor, etc.). Este trabalho tem o objetivo de estudar o efeito das condições climáticas brasileiras sobre o comportamento "agressividade" das abelhas africanizadas. Duas regiões geográficas distintas foram escolhidas, Ribeirão Preto, SP e Recife, PE. Testes de agressividade foram programados segundo metodologia de Stort (1971). Foram escolhidas 80 colônias sendo 40 no Nordeste (PE) e 40 no Sul (SP). Os estes foram programados para as quatro estações do ano sendo cinco os caracteres estudados. Os testes são realizados a cada 70 dias e com repetições. No final de cada bateria de testes as rainhas são transportadas de uma região para outra. Todas as rainhas foram marcadas com números para identificação. Cada lote de 40 colônias apresenta uma amostragem de abelhas cujo "pool" de genes que controla a agressividade das mesmas é representativo dos genes distribuídos na região de onde procederam. O transporte de rainhas entre as duas regiões possibilitou submeter um mesmo genótipo a condições ambientais distintas. Os principais resultados até agora foram: 1. O tempo necessário para ocorrer a primeira ferroadada é cinco vezes superior nas abelhas do Nordeste ( $\bar{x}$  para SP = 40,0 seg. e  $\bar{x}$  para PE = 8,0 seg.); 2. o tempo de enfurecimento é 2,2 vezes superior nas abelhas do Sul ( $\bar{x}$  para SP=46,9 seg. e  $\bar{x}$  para PE=21,3 seg.); 3. a distancia de perseguição é quase tres vezes superior nas colônias do Nordeste ( $\bar{x}$  para SP=210,2 m e  $\bar{x}$  para PE=575,4 m); 4. o número de ferrões na bola de camurça é 4,5 vezes superior na colônias do Nordeste ( $\bar{x}$  para SP=11,7 ferrões/min. e  $\bar{x}$  para PE=52,9 ferrões/min.); 5. o número de ferrões nas luvas foi 12,8 vezes superior nos testes no Nordeste ( $\bar{x}$  para SP=23,7 ferrões e  $\bar{x}$  para PE=304,1 ferrões/min.); outras variáveis foram estudadas. Em resumo, conclui-se que as abelhas africanizadas do Nordeste são tres vezes mais agressivas que as do Sul.

- \* BRANDEBURGO, M.M., GONÇALVES, L.S. y KERR, W.E. Estudo da correlação entre caracteres comportamentais (agressividade) de abelhas africanizadas e condições climáticas. *In Sociedade Brasileira para o Progresso da Ciência. Reunião Anual, 29., Brasília, DF, 1977. Resumos. Ciências e Cultura (Brasil) Suppl. 29(7):750-751. 1977.* (065)

Foram testadas, quanto a agressividade, 80 colméias de abelhas africanizadas sendo 40 em Recife-PE e 40 em Ribeirão Preto-SP. Após cada série de testes as rainhas (marcadas com números no tórax) de cada colônia foram transportadas de uma região para outra, na mesma época, e 70 dias após o transporte novos testes eram realizados. Desta forma os genótipos de cada população eram submetidos constantemente às diferentes condições climáticas de Nordeste e Sudeste do Brasil. De 1975 a 1977 foram realizados 215 testes de agressividade com 5 repetições, segundo a metodologia de Stort (1971). Foram analisados 5 caracteres de agressividade, bem como "Unidade relativo do ar", "Temperatura" e "Ganho de peso de cada colônia". Concluiu-se que: a agressividade das abelhas do Nordeste é tres vezes superior a agressividade das abelhas do Sudeste do Brasil. A temperatura média em cada região, nos dias de teste foi semelhante, embora em Ribeirão Preto tivesse havido extremos maiores. A umidade relativa do ar foi 64% em Recife e 54% em Ribeirão Preto. Após os transportes as abelhas do Nordeste tornaram-se mais mansas em Ribeirão Preto e as de Ribeirão Preto mais agressivas em Recife-PE. A umidade relativa do ar em ambas as regiões foi inversamente proporcional a temperatura. Houve correlação positiva entre umidade e caracteres de agressividade em Recife-PE. Em Ribeirão Preto a umidade não teve correlação com os caracteres de agressividade. Em Ribeirão Preto a temperatura influenciou diretamente na agressividade das abelhas (correlação positiva) e em Recife deu-se o contrário (correlação negativa). As outras variáveis estão sendo analisadas.

\_\_\_\_\_, GONÇALVES, L.S. y KERR, W.E. Influence of climatic conditions on the aggressive behavior of Africanized honeybee. *Apic. Clim. Quente Api. Hot. Clim. 1979:219-220.* 1979. (066)

\_\_\_\_\_. et al. Study of the biology of the Africanized honeybee in northeastern Brazil. *Apic. Cli. Quente Api. Hot. Clim. 1979:137-138.* 1979. (067)

- \* \_\_\_\_\_, GONÇALVES, L.S. y KERR, W.E. Effects of Brazilian climatic conditions upon the aggressiveness of Africanized colonies of honeybees. *s.l., s.e., 1982. pp. 255-280.* (068)

El trabajo fue desarrollado en Ribeirão Preto-SP y Recife-PE, en Brasil, con la finalidad de comprobarse la influencia del clima en el comportamiento hostil de las abejas africanas. Fueron utilizadas 40 colmenas en cada lugar, siendo ellas pobladas con abejas africanizadas, obtenidas en las regiones de estudio (muestra SP y PE). Todas las colmenas tuvieron su hostilidad, esto es, comportamiento de defensa, probados según la prueba desarrollada por Stort (1974) y los resultados iniciales muestran que las abejas de Recife son cuatro veces más hostiles que las de Ribeirão Preto. Después, fue ejecutado un plano de transposición de reinas de Recife para Ribeirão Preto y en sentido contrario, siendo luego las colmenas medidas nuevamente, después de 60 días. Este fue el tiempo necesario para que las obreras fueran substituidas por obreras hijas de las reinas transportadas. Los resultados mostraron que las abejas de ambas colmenas al ser trasladadas para Recife, eran más hostiles, mientras que en Ribeirão Preto la hostilidad disminuyó.

El análisis de los resultados de hostilidad (defensa) muestra que la diferencia inicial de hostilidad entre las abejas fue debido a la diferente influencia del ambiente de las regiones de Recife y Ribeirão Preto, y no la diferencia entre las propias abejas. Se notó también, que la diferencia de comportamiento hostil inicial se reduce con la permanencia de las abejas SP y PE en un mismo lugar.

El estudio de alguna relación entre los datos climatológicos y ambientales, muestra una relación positiva entre la humedad relativa y la hostilidad de la abeja, y relación negativa entre la variación de la temperatura y el comportamiento hostil.

De acuerdo a otros trabajos, es probable que la influencia de la humedad relativa no sea directa, y sí, por intermedio de variaciones en el potencial electrostático de la colmena.

Otros factores climatológicos como la temperatura, el estado general del tiempo y la lluvia, presentan relación con la hostilidad. Lo mismo sucede con el peso de las colmenas, aunque este factor se tenga relacionado negativamente con la lluvia, lo que puede ser de posible interés para el estudio de la biología de la abeja africanizada.

También se observó, que al compararse los resultados obtenidos por Stort (1974) en 1965, con nuestros resultados en 1976, hubo una disminución en la hostilidad de las abejas africanizadas de la región de Ribeirão Preto, SP.

\* BRASIL PONE a disposición de OIRSA laboratorio de abejas. La Nación, San José; Marzo 20, 1984:6A. (069)

Fue puesto a disposición del Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA) el laboratorio de genética de la abeja africanizada, con sede en la Universidad de São Paulo, Brasil.

THE BRAZILIAN bee problem. Bee World 54(1):9-10. 1973. (070)

BREGANTE, H. Criticism of a commentary on aggressive bees. Gaceta del Colmenar (Argentina) 35(10):302. 1973. (071)

BREYER, E. Las abejas africanas. Gaceta del Colmenar (Argentina) 29(322):42-44. 1967. (072)

BREYER, R. Consejos para una correcta instalación de un apiario con abejas híbridas africanas (*Apis mellifera brasiliensis*). Gaceta del Colmenar (Argentina) 32(365):279. 1970. (073)

BROWN, R.H. Adansonii management. Apic. Clim. Quente Api. Hot. Clim. 1979:187-192. 1979. (074)

\* BUCHMANN, S.L. Africanized bees confirmed in Panama. American Bee Journal 122(5):322. 1982. (075)

Previously unverified reports of Africanized honey bees (*Apis mellifera adansonii*) in Santa Fe, Darien, Panama, have been confirmed by Dr. David W. Roubik, research entomologist at the Smithsonian Tropical Research Institute. (Entomology Abstracts 13(7):5537. 1982).

- \* BURGETT, M. y AMBROSE, J.T. Biological control of the African-Brazilian honeybee (*Apis mellifera adansonii*). *American Bee Journal* 116(1):22, 26. 1975. (076)

Es la opinión de los autores que el problema que presenta la abeja africanizada puede resolverse utilizando el sistema de control de plagas, conocido como control biológico de insectos.

- \* BURRILL, R.M., DIETZ, A. y KOSSACK, C.F. Flight activity analysis of honeybees using Api-card generated data. *Apiacta* 12(3):110-112, 116. 1977. (077)

- \* BUSTILLOS GARCIA, L. Bibliografía sobre abeja africana (*Apis mellifera adansonii*). Caracas, Ministerio de Agricultura y Cría, 1977. 10 p. (078)

- CALDAS FILHO, C.F. y NOGUEIRA NETO, P. Abelhas africanas. *Apicultura (Brasil)* 19:1-13. s.f. (079)

- \_\_\_\_\_. y SILVA, R.M.B. DA. Notas preliminares sobre *Apis mellifera adansonii*. *Zootecnia (Brasil)* 2(2):9-18. 1964. (080)

- \_\_\_\_\_. Abelhas africanas e suas híbridos. *Zootecnia (Brasil)* 3(4):39-42. 1965; 4(1):47-51; (2):53-61; (4):47-57. 1966. (081)

También en español en: *Gaceta del Colmenar (Argentina)* 28(312):342-343. 1966.

- \* CALDERON, M. Reconocimiento, presencia de la abeja africanizada zona Carimagua. In Seminario Técnico sobre Abeja Africanizada, 1°, Bogotá, Colombia, 1979. Memorias. IICA. Informes de Conferencias, Cursos y Reuniones no. 190. 1979. pp. 94-97. (082)

Se realizó en 1979, una visita de reconocimiento a la zona aledaña a la Estación Experimental Carimagua, Colombia, no encontrándose abeja africanizada en esa zona.

- \* CAMARGO, P.P. La abeja africana arribó a Colombia y Venezuela y se dirige hacia México. *Gaceta Agrícola (México)* 21(549):16. 1976. (083)

Se hace referencia a la presencia de la abeja africanizada en Colombia y Venezuela y al manejo a que se le hace objeto en Brasil.

- CANTILL, R.C., HEPBURN, H.R. y WARNER, S.J. Changes in lipid composition during sealed brood development of African worker honeybees. *Comparative and Biochemistry Physiology, B* 68(2):351-353. 1981. (084)

The lipid composition of whole worker honeybees and of the fat-body were analysed over the course of sealed brood development. Decreasing fat-body wet weight was paralleled by decreases in extractable lipid, particularly of the triglyceride and fatty acid components. It is concluded that triglyceride stored in the fat-body constitutes a major source of energy for brood development and of precursor material for phospholipid synthesis during development of workers. (*Apicultural Abstracts* 33(1):115. 1982).

- \* CANTWELL, G.E. The African (Brazilian) bee problem. *American Bee Journal* 114(10):368-372. 1974. (085)

El autor de este artículo presenta evidencias a la información ofrecida hasta esa fecha sobre la abeja africanizada y comenta el informe que rindió el Comité sobre la Abeja Africana auspiciado por el Departamento de Agricultura de los Estados Unidos.

- CARLILE, W.R. Timely chats about beekeeping. *American Bee Journal* 111(2):68. 1971. (086)

- \* CARON, D.M. y REESE, J.C. An entomological visit to Panama - the next country in line for African bee invasion. *American Bee Journal* 122(2):112-114. 1982. (087)

Los autores ofrecen una descripción de Panamá incluyendo aspectos tales como agricultura, investigación y educación agrícola. Concluye señalando el potencial apícola no explotado del país pero con un futuro incierto ante la llegada de la abeja africanizada.

- CASAS, C.A. Informe de un viaje para estudiar las características y manejo de las abejas africanas. s.l., Estación Experimental de Manfredi, 1969. s.p. (088)

- \_\_\_\_\_. Abejas africanas. *Gaceta del Colmenar (Argentina)* 34(384):100. 1972. (089)

- \* EL CASO de las abejas asesinas. *Agricultura Venezolana* no. 138:10. 1973. (090)

Se describe varios casos de ataques trágicos de la abeja africanizada en Brasil.

- \* CASTAÑO QUINTERO, M. Informe de reconocimiento de la situación apícola en la región de la Intendencia del Arauca. In *Seminario Técnico sobre Abeja Africanizada, 1º*, Bogotá, Colombia, 1979. *Memorias*. IICA. Informes de Conferencias, Cursos y Reuniones, no. 190. 1979. pp. 75-80. (091)

Se constata la presencia de aproximadamente 1.500 enjambres de abeja africanizada en la Intendencia del Arauca, Colombia, en el año 1979.

- CHANDLER, M.T. The African honeybee - *Apis mellifera adansonii*: the biological basis of its management. In Crane, E., ed. *Apiculture in tropical climates*. London, International Bee Research Association, 1976. pp. 61-68. (092)

On the premise that the African honeybee, *Apis mellifera adansonii*, has important characteristics making it indispensable for the development of modern commercial beekeeping in the tropics, this review discusses the important biological differences distinguishing it from the widely adopted European races. The alarm and defence system of the bee is analysed in some detail, in order to emphasize the special care necessary when handling African bees. Swarms are not considered dangerous. Swarming is divided into three categories: reproductive, migratory and absconding, and the prevention or exploitation of each is proposed. Less important aspects briefly discussed are biometrics, build-up of colony populations, foraging behaviour, and disease resistance. It is concluded that the African bee offers great potential for selection of ecotypes suitable for commercial beekeeping in the tropics, if a new outlook to management is developed. (*Apicultural Abstracts* 28(4):1217. 1977).



CHARACTERISTICS OF Brazilian honey bee (*Apis mellifera*). American Bee Journal 112(10):368-369. 1972. (093)

CHAUD-NETTO, J. Flight behavior studies on diploid drones of Africanized honeybees, *Apis mellifera adansonii*. Journal of Apicultural Research 14(3/4):137-139. 1975. (094)

Marked drones (25 diploid and 22 haploid) were released in a colony, and observations on the duration of their flights were carried out for 5 h/day on 8 days between 19th May and 5th June. 20 diploid drones left the hive but only 5 returned, whereas 11 haploid drones flew and all returned. The 5 diploids which returned made a total of 13 flights, varying between 10.5 and 55 min. in duration (mean  $26.3 \pm 15.8$  min.); the 11 haploids made 17 flights (range 4.0-30.0 min., mean  $15.0 \pm 6.73$  min.). (Animal Behaviour Abstracts 4(3):3109. 1976).

\_\_\_\_\_. Fertile diploid drones in Africanized honey bees, *Apis mellifera adansonii*. Experientia 33(2):171. 1977. (095)

59 diploid drones of *Apis mellifera adansonii* were reared and tested for the presence of semen on the penis tip. Only 13 of the drones, aged 12-37 days, presented semen. The volume of semen collected ranged from  $0.3 \text{ mm}^3$  -  $1.0 \text{ mm}^3$ , but only 3 of the drones produced the latter amount, and only this number, therefore, would have had a reasonable chance of producing offspring. Hence, the difficulty of obtaining descendants from diploid drones of *A. m. adansonii*. (Entomology Abstracts 8:6881. 1977).

\* \_\_\_\_\_ . Are diploid drones of *Apis mellifera* L. attracted by queen pheromone? Ciencia e Cultura (Brasil) 30(5):608-610. 1978. (096)

Eight diploid drones of *Apis mellifera adansonii* (Hym., Apidae) twenty-one days old were used in order to test the queen pheromone efficacy in attracting these males. The diploid drones reacted normally (like the haploid drones) to queen pheromone. (Entomology Abstracts 10(1):221. 1979).

\* \_\_\_\_\_ . Morphological characterization of the diploid drones of Africanized honeybees (*Apis mellifera adansonii*). Ciencia e Cultura (Brasil) 30(6):727-731. 1978. (097)

Caracterização morfológica dos zangões diplóides de abelhas africanizadas (*Apis mellifera adansonii*). Vinte e quatro caracteres morfológicos foram utilizados em uma análise estatística multivariada desenvolvida para detectar possíveis diferenças entre zangões haplóides e diplóides de *Apis mellifera adansonii*. O novo método empregado neste experimento provou ser útil para caracterizar os zangões diplóides com 100% de probabilidade de êxito.

\* \_\_\_\_\_ . Ocelos claros (oc): a new mutation in *Apis mellifera adansonii*. Ciência e Cultura (Brasil) 29(3):316-318. 1978. (098)

O gene oc (ocelos claros) é recessivo ao padrão normal de coloração de olhos e ocelos (negros). Os olhos compostos são mais claros nas operárias do que nos zangões mas os ocelos tornam-se branco-vitrosos em abelhas, com 10 dias de idade. Este gene não é alelo de red ( $ch^r$ ) e laranja (la) e não é ligado a cordovan (cd). A mutação reduz a viabilidade de operárias e zangões e o tamanho da célula atua como fator limitante do desenvolvimento dos machos.

CHAUD-NETTO, J. y BUENO, O.C. Number of ovarioles in workers of *Apis mellifera adansonii* and *Apis mellifera ligustica*: a comparative study. *Journal of Apicultural Research* 18(4):260-263. 1979. (099)

Worker pupae of *Apis mellifera ligustica* and *A. m. adansonii* (330 of each) were discussed, and their ovaries excised. For each race, the mean number of ovarioles in the right and left ovaries were significantly different; in both, the left ovary had more ovarioles than the right. Significant differences were found between races, and between samples of the same race, for number of ovarioles in the right (and in the left) ovary, and in both together. In all groupings, the mean number of ovarioles were significantly greater in *A. m. ligustica* than in *A. m. adansonii*. (*Apicultural Abstracts* 31(4):1239. 1980).

\_\_\_\_\_. y KERR, W.E. Genetic mechanisms for the development of reproductive organs of *Apis mellifera* workers and diploid drones: a complementary hypothesis. *Revista Brasileira de Genética* 3(2):127-138. 1980. (100)

A study of the normal variation of ovariole number in *A. mellifera* workers was carried out in groups of 30 female pupae from each of 11 *A. mellifera adansonii* hives and 11 *A. mellifera adansonii* pupae was 1-11/ovary and 1-24 for *ligustica* hives. The number of ovarioles for *A. mellifera ligustica* pupae. A parallel study of the normal variation in size of testes in haploid drones was also carried out utilizing 20 *A. mellifera adansonii* and 20 *ligustica* drone pupae. The weight of testes was 46-56.5 mg for the *A. mellifera adansonii* drones, and 56-77 mg for the *A. mellifera ligustica* drones. The weight of the testes of 27 diploid *A. mellifera* male pupae was also studied. 21 (78%) had almost normal testes while 6 (22%) had very small testes. In contrast, 26 haploid drones from the same queen had normal testes. Of the workers from this hive, 75% showed a normal ovariole number (1-20/ovary) and 25% a larger number (21-95). The number of ovarioles in workers and the size of testes in diploid drones are probably governed by 2 major genes. (*Abstracts of Entomology* 11(12):71151. 1980).

\* CHAVES MORALES, A. Temperamento, características y manejo de la abeja africana (*Apis mellifera adansonii*). *Tecnología en Marcha (Costa Rica)* 1(4):19-20. 1979. (101)

Previsto el ingreso de la abeja africanizada a Costa Rica, se recomienda cambiar las técnicas apícolas para adaptarlas a estos insectos. Ofrece recomendaciones sobre el manejo de un apiario de abeja africanizada.

CLAUSS, B. y TIERNAN, L. A beekeeping handbook. Gabarone, Botswana, Ministry of Agriculture, 1980. 65 p. (102)

This simple teaching book is based on experience with *A.m. adansonii* in Southern Africa. It uses photographs, diagrams and easily understood captions to explain: reasons for keeping bees; equipment (top-bar hives, cardboard/cow-dung hives, and equipment improvised from local inexpensive materials); basic biology; management (how to start, handle, maintain and harvest honey from colonies); problems, pest and beneficial animals; beekeeping terms; costs; useful addresses. (*Apicultural Abstracts* 32(2):499. 1981).

- \* CLULOW, G.F. Afflictive aspects of African apiculture [adansonii race]. Gleanings in Bee Culture 97(9):557-560. 1969. (103)

El autor describe las dificultades que encontró para conseguir una colmena de abeja africana en Liberia, Africa Occidental.

- \* COBEY, S.W. To Australia with Apimondia. Gleanings in Bee Culture 106(6):268-270. 1978. (104)

Incluye *Apis mellifera adansonii*.

Ofrece una corta relación sobre la apicultura en Africa tropical.

- \* COMO CONTROLAR as abelhas africanas. Agrominas (Brasil) 1(4):25. 1968. (105)

- \* ¿COMO TRATAR las picaduras? La Nación, San José; Abril 22, 1983:6A. (106)

Explica brevemente el tratamiento a seguir ante una picadura de abeja africanizada.

- COMPARACION ENTRE abejas africanas y cárnicas. Gaceta del Colmenar (Argentina) 34(384):108. 1972. (107)

- \* CONNOR, L. Students of the honey bee. American Bee Journal 121(9):646. 1981. (108)

In April the USDA conducted a Research Review on the work it has done on the African honey bee. Information and misconceptions of the "killer bees" are presented. (Entomology Abstracts 13(6):4637. 1982).

- CONTRALOR DE la abeja africana y sus cruzamientos. Ley no. 20.739. Gaceta del Colmenar (Argentina) 36(414):306-307. 1975. (109)

- \* CORBELLA, E. y GONÇALVES, L. S. Relationship between weight at emergence, number of ovarioles and spermathecal volume of Africanized honey bee queens (*Apis mellifera* L.). Revista Brasileira de Genética 5(4):835-840. 1982. (110)

- \* CORDERO, L.F. Entrarán en pocos meses: abejas asesinas no son tan temibles; medidas preventivas deben tomarse desde ahora; si no son provocadas las abejas no atacan; no se pueden calificar de "asesinas". Semanario Universidad, San José; Marzo 12-18, 1982:19-20. (111)

En este artículo se presenta información sobre la historia de las abejas africanizadas, sus características y recomendaciones a seguir ante la presencia de este insecto.

- CORNEJO, L.G. Informe previo sobre un intento de italianización de una zona africanizada con *Apis mellifera adansonii* en Río Grande do Sul (Brasil). s.l., 1970. s.p. (112)

Presentado en: Congreso de Apicultura de la Provincia de Buenos Aires, 1970.

- \* CORNEJO, L.G. Tecnología del manejo de la abeja "africana". Producción Animal (Argentina) 2(2):52-58. 1970. (113)

Ofrece información sobre la distribución de la abeja africanizada en Africa y en América del Sur, sobre su comportamiento y producción, habiéndose constatado rendimientos altos mediante el uso de técnicas apropiadas de manejo y mejor conocimiento de esta abeja.

- \_\_\_\_\_. Más sobre la *Apis mellifera adansonii* Latr. Gaceta del Colmenar (Argentina) 34(382):46. 1972. (114)

- \_\_\_\_\_. et al. Resultados de los trabajos de italianización de una zona africanizada con *Apis mellifera adansonii* en el Estado de Río Grande do Sul. Apiacta 8(3):117-120. 1973. (115)

- \* COSENZA, G.W. y SILVA, T. Comparação entre a capacidade de limpeza de favos da abelha africana, da abelha caucasiana e de suas híbridas. Ciência e Cultura (Brasil) 24(12):1153-1158. 1972. (116)

Para se comparar a resistênciã às doenças de cria entre as abelhas africanas, as caucasianas e híbridas, inseriu-se um pedaço de favo com cria morta em um favo de cria de cada colméia testada e fizeram-se contagens periódicas do número de larvas e pupas mortas que eram retiradas.

Após 86 horas as colméias africanas haviam removido 100% da cria morta, as híbridas, 99,21% e as caucasianas, 85,90%.

Nao houve diferença significativa entre o comportamento das abelhas africanas e híbridas. O comportamento das abelhas caucasianas diferiu significativamente do comportamento das abelhas africanas e híbridas.

As abelhas africanas e híbridas demonstraram nítida superioridade em capacidade de limpeza de favos em relação às caucasianas.

- \* \_\_\_\_\_. Comparação entre a agressividade da abelha africana, da abelha caucasiana e de suas híbridas (Hymenoptera, Apidae). Revista Brasileira de Entomologia 16(3):13-15. 1972. (117)

The aggressiveness of African bees (*Apis mellifera adansonii* Latreille, 1804) is a problem for Brazilian beekeepers. African bees, Caucasian bees (*Apis mellifera caucasiana* Pollm., 1889) and their F<sub>1</sub> hybrids were tested in this experiment. It has been concluded that it is possible to select African bees according to aggressiveness and that the F<sub>1</sub> hybrids (African x Caucasian) were found to be 3.3 times less aggressive than the African bees. Thus, to reduce quickly the aggressiveness in an apiary of African bees, the best choice seems to be hybridization.

- \_\_\_\_\_. Comportamento e produtividade da abelha africana e de suas híbridas. Ser. Pesq. Ext. Sete Lagoas, Minas Gerais 19:1-8. 1972. (118)

- \_\_\_\_\_. Melhoramento de abelhas por meio da hibridação e seleção. In Congresso Brasileiro de Apicultura, 2º, Sete Lagoas, Brasil, 1972. [Anais]. Curitiba, Brasil, Associação Mineira de Apicultores, 1972. pp. 133-135. (119)

COSENZA, G.W. y BATISTA, J.S. Morfometria da *Apis mellifera adansonii* (abelha Africanizada) da *Apis mellifera caucasiana* (abelha caucasiana) e suas híbridas. In Congresso Brasileiro de Apicultura, 2º, Sete Lagoas, Brasil, 1972. [Anais]. Curitiba, Brasil, Associação Mineira de Apicultores, 1972. pp. 53-56. (120)

\* Também en: Ciência e Cultura (Brasil) 26(9):864-866. 1974.

The two kinds of bee referred to (A and C) result from crossing of Italian bees in Brazil with subsequently imported African bees and Caucasian bees respectively. The latter were introduced as a measure to reduce the undesirable effects of genes from *A. m. adansonii*. A table gives mean and coefficient of variation for worker weight, body length and tongue length, and cell size, for A and C and their hybrids. In general A showed smaller characters than C, and AC hybrids intermediate ones. (Apicultural Abstracts 26(1):121. 1975).

\* \_\_\_\_\_ . Comparação entre a produtividade da abelha africana, da abelha caucasiana e de suas híbridas. Revista de Agricultura (Brasil) 49(4):171-174. 1974. (121)

A fim de testar a viabilidade econômica das abelhas caucasianas e de suas híbridas com as abelhas africanas, obteve-se a produtividade destas durante um mês de fluxo nectarífero, concluindo-se as caucasianas puras são economicamente inviáveis e que as híbridas não diferem em produtividade das abelhas africanas.

\* \_\_\_\_\_ . Estudo dos enxames de migração de abelhas africanas (*Apis mellifera adansonii*). Revista de Agricultura (Brasil) 49(4):127-128. 1974. (122)

Foi feito um registro da ocorrência de enxames de migração de abelhas africanas na região de Viçosa, MG, verificando-se que o instinto migratório estava decrescendo e que a maioria dos enxames ocorre em época de escassez de nectar. Não se verificou instinto migratório nas híbridas F<sub>1</sub>.

CRANE, E. Bibliography of tropical apiculture. London, International Bee Research Association, 1978. 12 p. (123)

This bibliography of tropical apiculture contains 24 parts, dealing with: beekeeping in N. Africa and the Middle East, Africa South of the Sahara, the Indian subcontinent, Asia East of India, Northern Latin America, Southern Latin America, and the Pacific area; *Apis mellifera* of European and Asiatic origin in the Tropics; *A. mellifera* native to Africa; *A. mellifera* hybrids (Africanized bees) in America; the Asiatic hive bee *A. cerana*; the giant honey bee *A. dorsata*; the little honey bee *A. florea*; beekeeping with stingless bees; bee forage; beekeeping management and equipment; indigenous materials, methods and knowledge on beekeeping in the Tropics; bee diseases, enemies and poisoning; honey; beeswax and other hive products; descriptions of pollen grains in tropical honeys; bees for pollination; miscellaneous and author index. (Abstracts of Tropical Agriculture 6(7):33404. 1980).

CREWE, R.M. Aggressiveness of honeybee and their pheromone production. South African Journal of Science 72(7):209-212. 1976. (124)

The "Brazilian bee problem" which has resulted from the hybridization and spread of the African bee x European bee is discussed. The hybrid is a very efficient forager but has undesirable aggressive traits. The

role of pheromones in producing colony defence has been investigated and is reviewed. It is concluded that the alarm behaviour and the colony defence which it elicits are dependent on the production of pheromones by the mandibular and sting glands. Evidence suggest that for colonial defence the response thresholds to the pheromones are the important variables between strains rather than the pheromones concn produced. However, the conc pheromone has been shown to be correlated with aggressiveness. Two hypotheses to explain these results are discussed. The first suggests that the mandibular glands control the conc dependent behaviour while the sting gland, which has no reservoir in which to store glandular product, may have different effects due to different response thresholds. The 2nd hypothesis is that the correlation between the amount of mandibular gland secretion and behavioural data is spurious and that the aggressive behaviour is determined by differences in response thresholds. (Animal Behaviour Abstracts 5(2):2007. 1977).

CREWE, R.M. y HASTINGS, H. Production of pheromones by workers of *Apis mellifera adansonii*. Journal of Apicultural Research 15(3/4):149-154. 1976. (125)

Pheromones secreted by the mandibular glands and the sting apparatus of *A. mellifera adansonii* workers of known ages were analysed quantitatively. Production of both pheromones was found to vary with age. Isopentyl acetate in the sting apparatus reached a peak ca 20 days after emergence. The amount of 2-heptanone produced by the mandibular glands was small for the first 14 days after emergence, but increased continuously after this age. (Entomology Abstracts 8: 5783. 1977)

\* CRUZ LANDIM, C. DA. Hemocitos de rainha de *Apis mellifera adansonii* (Hymenoptera-Apidae). Estudo ao microscópio óptico e eletrônico. Revista Peruana de Entomologia Agrícola 14(2):238-245. 1971. (126)

O presente trabalho é uma tentativa de associando microscopia óptica e eletrônica, caracterizar os tipos de células presentes no sangue circulante da rainha de *Apis mellifera adansonii*.

Em esfregaços preparados com hemolinfa obtida por decapitação encontram-se 8 tipos diferentes de células, a saber: plasmatócitos, células granulares, células com esférulas, adipohemócitos, oenócitoides, células vermiformes, cistócitos e células muito pequenas. O tipo mais frequente é o plasmatócitos, que corresponde a 70-80% do total de células. Esse total é em média de 3.824 células/mm<sup>3</sup> de hemolinfa. A hemolinfa do sinus dorsal, fixada "in locus" e examinada através da microscopia eletrônica, revelou apenas 3 tipos diferentes de células que parecem corresponder aos plasmatócitos, células granulares e células com esférulas. A morfologia dessas células ao microscópio eletrônico é descrita.

\_\_\_\_\_. Estudo do corpo gorduroso de *Apis mellifera adansonii* ao microscópio óptico e eletrônico. In Congresso Brasileiro de Apicultura, 3º, Piracicaba, SP, Brasil, 1974. Anais. Ed. por L.S. Gonçalves. Ribeirão Preto, SP, Brasil, Fac. Medicina, Dept. Genética, 1975. pp. 137-144. (127)

Fat-body cells from larval, pupal and adult *A.m. adansonii* varied in size, and in quantity and quality of food reserves. Lipids, protein and glycogen were present in larval and pupal cells, but in adults the reserves were almost entirely of fat. The tissue was

better developed in queens than in workers. The greater development of the endoplasmic reticulum in the adult indicates that these cells are more active in synthesis than those in larvae. (Apicultural Abstracts 28(4):1190. 1977).

- \* CRUZ LANDIM, C. DA. Degenerative changes in heart muscle from senescent honeybee workers (*Apis mellifera adansonii*). Journal of Invertebrate Pathology 27(1):1-5. 1976. (128)

The electron microscope of cardiac muscles from the honeybee showed degenerative alterations due to aging. The ultrastructural alterations appear mainly in the mitochondria and myofibrils. Lysosomes play some role in the degenerative process.

- \* CURSO INTERNACIONAL DE BIOLOGIA E GENETICA DE ABELHAS AFRICANIZADAS, RIBEIRÃO PRETO, BRASIL, 1983. [Programa]. Ribeirão Preto, SP, Brasil, Universidade de São Paulo, 1983. 4 p. (129)

- DALY, H.V. y BALLING, S.S. Identification of Africanized honeybees in the Western Hemisphere by discrimination analysis. Journal of the Kansas Entomological Society 51(4):857-869. 1978. (130)

Africanized honeybees (the hybrid offspring of African *Apis mellifera adansonii* and European *A. mellifera*) are not readily distinguished from European bees by using conventional methods. A discriminant analysis using 25 morphological characters is described which separated 101 collections of Africanized bees from 297 collections of European bees. The method is explained and discriminant coefficients for 5 sets of characters are provided. Individual bees could also be identified, but with a higher risk of misclassification. (Apicultural Abstracts 31(1):186. 1980).

- DARCHEN, R. La thermorégulation et l'écologie de quelques espèces d'abeilles sociales 'Afrique (Apidae, Trigonini et *Apis mellifera* var. *adansonii*). Apidologie 4(4):341-370. 1973. (131)

Temperatures were measured inside the nests of various species in areas of the Ivory Coast (tropical climate) and of Gabon (equatorial). Some stingless bees have adapted successfully to these climates, as a result of their ability either to regulate their nest temperature (*Dactylurina*, *Hypotrigona*) or to nest in a vacant section of a termitary where they have the advantage of a stabilized temperature (*Trigona eburnensis*). Some *Meliponula* establish themselves in an environment sufficiently similar to the one from which they originate. *Apis mellifera adansonii*, although less able to regulate the temperature of its nest, has adapted to new environments by various means, including the use of subterranean cavities as nests. (Apicultural Abstracts 26(3):586. 1975).

- \_\_\_\_\_. L'élevage d'*Apis mellifera adansonii* dans le sud-ouest de la France [Rearing of *Apis mellifera adansonii* in Southwestern France]. Gazette Apicole 77(827):222-224, 232. 1976. (132)

A colony of *A. mellifera adansonii*, which was observed for a year in a small, unheated hive, produced 10 kg of honey. It drew out comb on foundation made for European bees. Three hybrid colonies (*adansonii*

queen mated with *ligustica* drones) overwintered outside, in the normal conditions of the area. (Apicultural Abstracts 28(4): 1216. 1977).

DARCHEN, R. /Swarming of African stingless bees (*Hypotrigena*), laying of the queen and dynamics of some young colonies in Gabon/ (En francés). *Apidologie* 8(1):33-59. 1977. (133)

\_\_\_\_\_. /Focusing on the aggressiveness of *Apis mellifera adansonii*/ (En francés). *Gazette Apicole* 79(842):54-58. 1978. (134)

DAVILA N., M.F., ORTIZ, M.S. y HUIZA DE R., I. Presencia de la abeja africanizada en el Perú. *Revista Peruana de Entomología Agrícola* 23(1):125-127. 1980. (135)

\_\_\_\_\_, ORTIZ P., M. y REDOLFI, I. Presencia de la abeja africanizada en el Perú (*Apis mellifera mellifera* Linné x *Aphis mellifera adansonii* Latreille). (Sumario). In *Convención Nacional de Entomología, Huacho, Perú, 1980. /Resúmenes/*. Huacho, Perú, Sociedad Entomológica del Perú, 1980. p. 66. (136)

\* DECLARAN EMERGENCIA nacional por invasión de abeja africanizada. *La Nación*, San José; Dic. 5, 1983:8A. (137)

En este artículo se informa sobre el decreto ejecutivo que declara emergencia nacional la presencia de la abeja africanizada en Costa Rica.

Se señala además las contradicciones entre técnicos del Ministerio de Agricultura y Universidad de Costa Rica que pugnan entre su erradicación o convivencia con ellas y se mencionan los lugares en donde existe esta abeja en el país y medidas a tomar para evitar su avance hacia otras regiones.

\* DECRETO No. 15137-MAG /sobre abeja africanizada/. *La Gaceta*, San José; Enero 25, 1984:1. (138)

Decreto de Estado de Emergencia de la apicultura en Costa Rica, debido a la presencia de la abeja africanizada en el país. Mediante este decreto se prohíbe lo siguiente: 1) tránsito o migración de material biológico apícola de la zona sur hacia la meseta central y norte del país; 2) establecimiento de puestos de cuarentena; 3) colaboración de parte de empleados y funcionarios del MAG, autoridades de Gobernación y guardias fiscales para el control de la abeja africanizada; y 4) destrucción de enjambres y colonias africanizadas silvestres o rústicas, etc.

\* DE JONG, D. y DE JONG, P.H. Longevity of africanized honey bees (Hymenoptera: Apidae) infested by *Varroa jacobsoni* (Parasitiformes: Varroidae). *Journal of Economic Entomology* 76(4):766-768. 1983. (139)

The longevity of normal and varroa-infested Africanized honey bees, *Apis mellifera* L., was compared. The degree of infestation was determined by counting the adult and deutonymphal female mites present in the brood cell when the adult bee emerged. Uninfested control bees lived an average of 27.6 days; infested bees lived only 13.6. Bees infested with two or more mites lived 8.9 days. The number of mites per bee was significantly negatively correlated with both longevity and weight at emergence. There was no significant correlation between weight at emergence and longevity for infested or uninfested bees. Reduction in longevity appears not to be merely a secondary result of reduced adult weight.



- \* DE JONG, D. Africanized bees now preferred by Brazilian beekeepers. *American Bee Journal* 124(2):116-118. 1984. (140)

- \* DESDE BRASIL rumbo al norte, fiera abeja dispersa los colmenares. *Agricultura de las Américas* 22(2):34-35. 1973. (141)

Se presenta las características agresivas de la abeja africanizada, su resistencia y laboriosidad. Hasta el año 1973, se había extendido desde Brasil hasta Paraguay, Argentina, Bolivia y Perú, con un promedio de 320 km al año.

- \* DETECTAN LA posible presencia de abejas "asesinas" en Pavas. *La Nación*, San José; Dic. 22, 1983:12A. (142)

Ante la presencia de un posible enjambre de abejas africanizadas en la región de Pavas, Costa Rica, se tomó algunas muestras de abejas para analizarlas en la Universidad de Costa Rica y definir si se trata de este insecto.

- DIETZ, A. An anatomical character suitable for separating drone honeybees of *Apis mellifera ligustica* from *Apis mellifera adansonii*. *Apic. Clim. Quente Api. Hot. Clim.* 1979:102-106. 1979. (143)

- \* EN DOS años se espera llegada al país de "abejas asesinas". *La Nación*, San José; Junio 4, 1979:4. (144)

Ante la llegada a Costa Rica de la abeja *Apis mellifera adansonii* prevista para 1981, la Escuela de Ciencias Ambientales de la Universidad Nacional estudió las medidas que puedan minimizar el impacto de su llegada. Incluye información sobre las características de la abeja y forma de actuar ante la presencia de este insecto.

- DOUCHET, M. Les abeilles du Tchad. *Gazette Apicole* 79(845):134-135. 1978. (145)

Bees, bee forage, beekeeping and its possible improvement.

- DU PREEZ, H.L.H. y WALTERS, M.C. The influence of pollination of African honeybees (*Apis mellifera adansonii*) on large white Kidney bean (*Phaseolus multiflorus*) production in the Transvall Highveld. *Phytophylactica* 7(1):53-58. 1975. (146)

The influence of pollination by *A. mellifera* on the yield and development of *P. multiflorus* was investigated over a period of 4 years. Access to flowers by pollinating agents was controlled so as to create 3 treatments for comparison: a treatment where access was restricted to *A. mellifera* by means of special cages, a treatment where all recognized pollinating agents were excluded by means of cages, and a treatment in which free access was allowed to all pollinating agents. *A. mellifera* were found to be important pollinating agents and their activities were found to be responsible for highly significant increases in yield. Poor pollinating due to the exclusion of agents was found to lead to an extension of the flowering period and on increased proportion of immature pods present at harvest time. (*Entomology Abstracts* 7:1584. 1976).

- \* DURON AVILES, E. La apicultura en el área del OIRSA y lineamientos generales para el establecimiento de un plan de acción contra la abeja africanizada. s.l., Organismo Internacional Regional de Sanidad Agropecuaria, 1983. 9 p. (147)

Presentado en: Coloquio sobre la Abeja Africanizada, 1º, San Pedro Sula, Honduras, 1983.

Se presenta información sobre las gestiones realizadas por el OIRSA en vista de la presencia de la abeja africanizada en América Central, y el plan de emergencia para la prevención de este insecto. El plan, con la participación de México, Centro América y Panamá, Departamento de Agricultura de los Estados Unidos, FAO y otros países y organismos interesados, contempla las siguientes fases: 1) prevención y detección de la abeja africanizada; 2) entrenamiento de profesionales en apicultura; 3) asesoramiento técnico; 4) presupuesto; 5) personal.

- \* ECHEVERRY ARANGO, R. Las africanas vuelan a Colombia. s.n.t. 2 p. (148)

Se afirma que las abejas africanizadas siguen siendo tan agresivas como siempre debido a que su irritabilidad está determinada por genes dominantes y la mansedumbre de las razas europeas está dada por genes recesivos. Esta información fue brindada por M.D. Levin y O.R. Taylor, quienes presentaron casos de ataques en Brasil y un plan de acción preventivo consistente en entrenamiento de personal capacitado y estudios de biología y costumbres de este insecto, extensión y capacitación de apicultores.

- \* \_\_\_\_\_. Consideraciones sobre el uso de reinas de razas criollas en los programas de control de las abejas africanizadas. In Seminario Técnico sobre Abeja Africanizada, 1º, Bogotá, Colombia, 1979. Memorias. IICA. Informes de Conferencias, Cursos y Reuniones no. 190. 1979. pp. 72-74. (149)

El autor aconseja utilizar en Colombia en los programas de control de las abejas africanizadas la *Apis mellifera carnica*, cuyos híbridos conservan la propiedad de ser mansos.

- "EDITORIAL"; CONTINENT of tomorrow. Bee World 53(3):101. 1972. (150)

- \* EDRICH, W. Night-time sun-compass behaviour of honey bees at the equator. *Physiological Entomology* 6(1):7-13. 1981. (151)

In accordance with the peculiarities of the sun's azimuthal path near the equator, African honey bees observed in their night-time dances apparently allowed for the azimuth moving backwards at night relative to its day-time movement. In several cases the bees evidently inferred the actual azimuthal position of the sun, rather than the one that would result from extrapolating a uniform movement of the sun.

- \* EFECTO DE la edad de la cría muerta en el comportamiento higiénico en abejas de *Apis mellifera* (africanizadas). *Ciencia y Abejas (Argentina)* 6(22):21. 1980. (152)

Los resultados obtenidos en este trabajo, mostraron que la edad de la cría muerta influye marcadamente en el comportamiento higiénico de la abeja africana.

- \* EMDE, E. More on the African bee. *American Bee Journal* 117(3):172, 185. 1977. (153)

- \* ENJAMBRE DE abejas asesinas atacó en barrio de Caracas. La República, San José; Feb. 2, 1983:6. (154)

Se informa brevemente sobre un ataque sin consecuencias graves que sufrieron unas 20 personas en un restaurante chino en Caracas, el cual fue controlado por los bomberos protegidos con trajes especiales y armados de insecticidas.

- \* ENTOMOLOGO HABLA sobre la abeja africanizada. La Nación, San José; Nov. 28, 1983:7B. (155)

El Dr. William Ramírez, entomólogo y miembro de la Comisión Nacional sobre Apicultura, describe en forma sencilla y amena las características de la abeja africana.

- \* ENTRENAN A bomberos para llegada de "abeja asesina". Semanario Universidad, San José; Enero 4-10, 1983:14. (156)

Se brinda información de un curso para bomberos en Costa Rica sobre el manejo de emergencias provocadas por la abeja africanizada; sobre la capacitación que recibirán personas que se especializarán en el exterior, así como la necesidad de establecer un programa de crianza de reinas mansas masivo para sustituir las reinas de colonias africanizadas.

- ESCALANTE, O.S. African bee in South America. In International Apicultural Congress, 23rd., Moscow, 1971. Proceedings. s.l., s.e., 1972. pp. 394-395. (157)

- \* ESPINA PEREZ, D. y ORDEXT, G.S. La raza africana amarilla. In \_\_\_\_\_ y Ordext, G.S. Apicultura tropical. 2a. ed. Cartago, Costa Rica, Editorial Tecnológica de Costa Rica, 1981. pp. 67-68. (158)

Los autores señalan que la *Apis mellifera adansonii* tiene un rendimiento de mil en un 20% superior al de las abejas italianas. Esta característica motivó su introducción en el Estado de Sao Paulo, Brasil en 1956, habiendo tenido una propagación tan rápida que la población de abejas en este Estado pertenece a esta subespecie o a sus cruzamientos. La agresividad la ha convertido en una plaga, habiendo invadido Argentina (Misiones) y Paraguay, Estado de Río Grande do Sul en Brasil y Venezuela. Los autores recomiendan tomar medidas que impidan la introducción de esta raza en otras regiones.

- \* \_\_\_\_\_. La abeja africana y cómo recibirla. Foro de La Nación. La Nación, San José; Junio 30, 1982:16A. (159)

El autor manifiesta que ante el inminente avance de las abejas africanizadas a Costa Rica, se deben tomar medidas urgentes para evitar consecuencias serias para la economía apícola, además del peligro que representa para las personas debido al desconocimiento de la forma de enfrentar estas abejas. En caso de picaduras, anota algunos consejos inmediatos a seguir mientras se traslada la persona afectada al centro médico más cercano.

- \* \_\_\_\_\_. Las abejas africanizadas en América Central. La Nación, San José; Ago. 9, 1983:16A. (160)

En el mes de junio, se realizó en San Pedro Sula, Honduras, el primer coloquio americano sobre la abeja africanizada. En este artículo se

sintetiza los asuntos tratados en esta reunión y las conclusiones de las mismas. Los principales temas tratados fueron: 1) avance de la abeja africanizada sobre la región; 2) características negativas de estas abejas; 3) el exterminio de enjambres o de colonias de abejas africanizadas no está justificado; 4) consecuencias de la picadura de abejas a personas muy sensibles; 5) productividad; y 6) aprovechamiento de vigor híbrido.

- \* ESPINA PEREZ, D. ¿Qué hacer con las abejas africanizadas? La Nación, San José; Dic. 8, 1984:16A. (161)

Este artículo indica las cualidades sobresalientes e indeseables de la abeja africana y algunas recomendaciones que no son adecuadas, tales como el exterminio de enjambres y fauna insectícola en una faja del istmo centroamericano. Muestra preocupación de que la abeja *Apis mellifera adansonii* sea portadora del ácaro *Varroa jacobsoni*. Recomienda un buen manejo con el fin de obtener el máximo provecho de ellas.

- \* ESTIMAN PROBABLE llegada a abeja asesina a Centro América. La Nación, San José; Set. 23, 1980:19A. (162)

El Dr. David W. Roubik, del Instituto Smithsonian para Investigaciones Tropicales, informa que la abeja africana llegará a Costa Rica en 1981 y que se podrá detectar su presencia por la perforación de muchas flores para robar el polen y por la muerte inexplicable de animales. Manifiesta que esta abeja es muy sensible a olores fuertes, ruidos intensos o vibraciones, a los que responde con ataques masivos y prolongados.

Explica que su expansión desde Brasil hace unos 23 años, ha encontrado la barrera infranqueable de Los Andes, debido a que no pueden volar más alto de 3.000 metros.

- \* EXPERIENCIAS DE un apicultor en el manejo de abeja africanizada. La Nación, San José; Set. 20, 1983:7C. (163)

Se dan a conocer las experiencias del técnico apícola Alfredo Villalobos, relacionadas con el manejo de la abeja africanizada en Cartagena, Colombia.

- \* FALTA DE recursos retrasa plan contra "abeja asesina". La Nación, San José; Set. 27, 1981: 4A. (164)

Se menciona la imposibilidad de llevar a cabo el proyecto de control de la abeja africanizada en Costa Rica debido a su alto costo. El objetivo era producir reinas mansas y productivas para sustituir las africanizadas, y que cada apicultor produzca zánganos mansos, de manera que las reinas africanizadas que salgan en vuelo nupcial tengan la posibilidad de ser fecundadas por alguno de ellos; este procedimiento es factible de realizar por cualquier apicultor.

EXPERTS ASSESS the Brazilian bee problem. Bee World 53(4):178-179. 1972. (165)

FERNANDEZ R., G. y ESPINOSA, J.M. Preparan hogar en Costa Rica para las abejas asesinas. La Nación, San José; Enero 13, 1974:4A. (166)

FIELDING, K. y HEPBURN, H.H. Honeybee flight: development of the skeleto-muscular system. South African Journal of Science 75(10):464-465. 1979. (167)

\_\_\_\_\_, HEPBURN, H.R. y CHANDLER, H.D. Development of flight competence in worker honeybee (*Apis mellifera adansonii*). Comp. Biochem. Physiol. A. Comp. Physiol. 65(1):129-134. 1980. (168)

The mechanical properties of flight muscle were measured in worker honeybees at various developmental stages. Stiffness and maximum stress are age-dependent, while the elastic limit is about constant over the study period. The development of mechanical stiffness of the flight muscle is slower than that of the skeleton, but is simultaneous with the development of the energy-producing systems of the flight muscle and is at all times appropriate for the behaviour of the bee. Mechanical stiffness is a useful, valid index of muscle competence. (Abstracts of Entomology 11(5):58322. 1980).

FINAL REPORT released from the "Committee on the African honey bee". American Bee Journal 112(9):330-334, 338; 112(11):418-419. 1972. (169)

\* FINALLY, A study of africanized bees in Argentina. American Bee Journal 122(12):806. 1982. (170)

\* FLECHTMANN, C.H.W. A abelha "africanizada" e a disseminação do *Acarapis woodi* (Rennie) no Brasil. Anais da Sociedade Entomologica do Brasil 6(1):130-131. 1977. (171)

Las abejas africanas han contribuido con la diseminación del ácaro *Acarapis woodi*, calculándose que en pocos años habrá alcanzado amplia distribución en Brasil. El autor recomienda ser cuidadoso con el intercambio de las abejas, especialmente de las reinas.

FLETCHER, D.J.C. First observations on Cape bees kept in Natal. South African Bee Journal 47(3):5-8. 1975. (172)

\_\_\_\_\_. New perspectives in the causes of absconding in the African bee (*Apis mellifera adansonii* L.). I. South African Bee Journal 47(6):11, 13-14. 1976. (173)

\_\_\_\_\_. New perspectives in the causes of absconding in the African bee (*Apis mellifera adansonii*). II. South African Bee Journal 48(1):6-9. 1976. (174)

Food shortage appears to have been over-rated as one of the causes, as some colonies abandon substantial food stores, and others, after destroying the unsealed brood, use up their reserves while waiting for the older brood to emerge. This behaviour tends to conserve the foraging force and hence its survival value after absconding. An argument against the possibility that food shortage causes seasonal long-range migrations is outlined. Inferior nesting sites, such as small holes in the ground, which are readily occupied, may have to be hastily abandoned under adverse conditions. Evidence obtained from a number of colonies kept in observation hives shows that frustration of swarming in various ways also leads to absconding. The suspected limited thermoregulatory capability of *A.m. adansonii* and the infestation of unprotected combs by wax moths are discussed as further probable causes of absconding. (Apicultural Abstracts 28(4):1229. 1977).

FLETCHER, D.J.C. *Adansonii* v. imported races of honeybees in Africa. Bee Line 14(7/8):14-15. 1977. (175)

\_\_\_\_\_, ed. African bees: taxonomy, biology and economic use. Pretoria, South Africa, Apimondia Publishing House, 1977. s.p. (176)

\_\_\_\_\_. Evaluation of introductions of European honey bees into southern and eastern Africa. In Proceedings of the International Union for the Study of Social Insects 8: 146-147. 1977. (177)

\_\_\_\_\_. The African bee, *Apis mellifera adansonii*, in Africa. Annual Review of Entomology 23:151-171. 1978. (178)

A review is presented on *A.m. adansonii* (Hym., Apidae) in Africa in order to show its adaptation to its unique environment. The following subjects are covered: 1) status of *A.m. adansonii* in Africa: (a) importations of European bees, (b) results of importations, (c) African races of honeybees; 2) biology: (a) nesting habits and thermoregulation, (b) foraging behaviour, (c) natural enemies, (d) stinging behaviours, (e) fecundity and rate of development, (f) swarming, (g) migration and absconding and (h) mating behaviour. (Entomology Abstracts 9(11):7750. 1978).

\_\_\_\_\_. Management of *Apis mellifera adansonii* for honey production in Southern Africa. Apic. Clim. Quente Api. Hot. Clim. 1979:86-89. 1978. (179)

\_\_\_\_\_. y JOHANNISMEIR, M.F. The status of beekeeping in South Africa. South African Bee Journal 50(4):5-20. 1978. (180)

This report seeks to identify reasons for the slower growth of a modern beekeeping industry in South Africa than in many other countries. Honey production, though it has increased recently, is rather low; beeswax production is also small. Domestic demand for honey is poor, but could be stimulated, and there are available export markets for wax.

The variety and extent of nectar sources, which are probably not fully exploited, are discussed. After a summary of some of the problems in managing *Apis mellifera adansonii*, recommendations are made; now that a modern beekeeping industry has been established, the next phase should consist of regular requeening of colonies. Phase 3 would involve a selective breeding programme to produce strains in which high productivity is combined with docility and other desirable characteristics. A publication dealing adequately with the specific problems of managing *A.m. adansonii* is needed.

*A.m. adansonii* is an important pollinator of many crops (particularly kidney bean, sunflower, citrus and lucerne), but beekeepers usually supply colonies free of charge. (Apicultural Abstracts 30(4):1265. 1979).

\_\_\_\_\_. Vibration of queen cells by worker honey bees and its relation to the issue of swarms with virgin queens. Journal of Apicultural Research 17(1):14-26. 1978. (181)

In 4 honeybee colonies (*Apis mellifera adansonii*: Hym., Apidae) where the workers did not perform vibratory dances on emergency queen cells, the first queen to emerge attacked the other queen

cells. The queens were not themselves vibrated until they had destroyed these cells, and they did not pipe. On average they matured in 7 days 2 h after their cells were sealed. In 3 other colonies the workers vibrated emergency queen cells, and this behaviour was associated with imprisonment of most of the queens, piping by one of the first queens to emerge, and swarming. Typically, the number of vibratory dances performed rose to a peak on all cells at about the time the first queens matured. The number then dropped sharply when a free queen began to pipe, but rose to a new peak in the absence of piping when that queen left the hive with a swarm. Some of the workers vibrated individual cells at an increased rate while other workers were resealing cuts made in the cell caps by the queens in them. It is concluded that both vibratory dances and queen piping play a role in the imprisonment of queens through inhibition, although other mechanisms are also involved. Vibration of queen cells and of workers on them, as well as of free virgin queens, appeared to protect the cells from attack. If virgin queens were vibrated in the presence of imprisoned queens, they piped and were sometimes chased by the workers. On the other hand virgin queens that were not vibrated did not pipe and remained quietly in the lower part of the hive. Piping may therefore be interpreted as a 'displacement activity' caused by conflicting activating and inhibiting stimuli. The three colonies in which queen cells were vibrated produced 4 swarms, 2 of which were accompanied by more than one virgin queen. Some of the supernumerary queens emerged before swarming, and others emerged while the bees were leaving the hive. The data presented are all consistent with the 'inhibition hypothesis' concerning the function of vibratory dances. (Animal Behaviour Abstracts 6:4376. 1978).

FORD, D.M., HEPBURN, H.R. y RIGBY, J. Do honeybees (*Apis mellifera adansonii*) measure their pollen loads? South African Journal of Science 75(11):511-512. 1979. (182)

\* FORTALECEN MEDIDAS para controlar a la abeja africanizada. La Nación, San José; Set. 19, 1983:2A. (183)

El OIRSA anunció la aprobación de medidas cuarentenarias contra la abeja africana en los países centroamericanos, con el apoyo del Gobierno de México. Además, facilitará la infraestructura necesaria para la realización del 4° Curso Internacional de Cuarentena Agropecuaria en el mes de octubre 1983. Se incluyen breves detalles sobre la presencia y posterior peligro de la abeja africanizada en Costa Rica.

FRANZ N., K.-H. La raza *mellifera adansonii*: su mestizaje y propagación en América del Sur, análisis y conclusiones. s.n.t. (184)

FRAZIER, C.A. Brazilian honey bee. Ann. Allergy 32(3):146-150. 1974. (185)

A strain of honey bee that is not yet present in the USA seems likely to enter the continent from the S., if the spread is neither hindered nor helped through human agencies. This strain, now rapidly extending its range in S. America, has both objectionable and dangerous attributes. Because of its unprovoked mass stinging and because of its frequent swarming and absconding, the Brazilian bee is dangerous to people and animals and its difficult to manage. There is known geographic or climatic barrier that will prevent the spread of the Brazilian bee into N. America. Much research is going into the study of the sp. and prevention of its entering the USA. (Entomology Abstracts 5:6032. 1974).

- \* FUENTES, J.L. El veloz vuelo de la abeja africanizada. La República, San José; Junio 12, 1983:14. (186)

El autor brinda información sobre la llegada de la abeja africana a Costa Rica, incluyendo mapa del recorrido de la abeja africanizada desde 1957 hasta su arribo a Costa Rica en 1982 y su posterior tramo hasta llegar al otro extremo del continente. Presenta pasos a seguir en caso de picadura de esta abeja.

- GADBIN, C., CORNUET, J.-M. y FRESNAYE, J. Approche biométrique de la variété locale d'*Apis mellifera* L. dans le sud tchadien. Apidologie 10(2):137-148. 1979. (187)

Measurements of 5 characteristics, followed by a statistical analysis, showed that the honeybee in this area are *Apis mellifera adansonii*. Using discriminant factor analysis the population was shown to be quite distinct from African honeybee races to the north of the Sahara and from European races. However, different populations within Chad could not be distinguished. (Apicultural Abstracts 32(1):198. 1981).

- \* GAMERO, A.M. Coordinación de la información y complementación de la acción científica y técnica a distintos niveles. Producción Animal (Argentina) 2(2):58-61. 1970. (188)

Se expresa la necesidad de contar con información veraz y objetiva y con intercambio científico sobre la abeja africana para evitar el sensacionalismo y aprovechar eficientemente los esfuerzos que se realizan a nivel individual e institucional dentro del campo de la apicultura. Promueve la formación de un centro de información y coordinación especializado en la apicultura como ciencia.

- GARCIA GENIZ, J.V. African bees in Argentina (*Apis mellifera adansonii*). Gazette Apicola 74(793):196-198. 1973. (189)

- \* \_\_\_\_\_. Abejas africanas en Tucumán [*Apis mellifera adansonii*]. Tucumán, Argentina. Estación Experimental Agrícola. Circular no. 192. 1974. 5 p. (190)

Se expone la experiencia obtenida en los colmenares del Monasterio de Cristo Rey en Tucumán, Argentina, con el apareamiento de reinas cárnicas o italianas con zánganos africanos. Incluye información sobre la introducción de la abeja africana a Brasil y cualidades y conducta de esta abeja.

- \_\_\_\_\_. Manejo de un colmenar africanizado. Gaceta del Colmenar (Argentina) 36(11):358-360. 1974. (191)

- \* \_\_\_\_\_. Abejas africanas en Tucumán. Res (Argentina) 42(931):22-24. 1975. (192)

Publicado también en: Gaceta del Colmenar (Argentina) 47:24-26. 1975.

Describe las características de la "abeja brasilera". Expone el método utilizado en los colmenares del Monasterio de Cristo Rey, situado a 1.070 m.s.n.m. en Argentina, por medio del cual pudo crearse un enjambre de zánganos no africanos, que al aparearse con reinas vírgenes agresivas pueden procrear abejas con menos agresividad.

- \* GARY, N.E. Possible approaches to controlling African bee. American Bee Journal 111(11):426-429. 1971. (193)



GARY, N.E. El eventual peligro de la abeja brasileña para la apicultura de los Estados Unidos. *Apiacta* 8(3):113-114. 1973. (194)

GOLTZ, L. Committee report on African honeybee. *Gleanings in Bee Culture* 100(10):295-296. 1972. (195)

\_\_\_\_\_. Sobre el informe del Comité acerca de la abeja melífera africana. *Apiacta* 8(3):97-98. 1973. (196)

\_\_\_\_\_. The Brazilian bee: do Brazilians see it differently? *Gleanings in Bee Culture* 102(10):303-304. 1974. (197)

GOMEZ RODRIGUEZ, R. Manejo de poblaciones de abejas africanizadas. Venezuela. Dirección General de Desarrollo Ganadero. Técnicas y prácticas apícolas no. 6. 1978. 18 p. (198)

\_\_\_\_\_. Presencia de la abeja africanizada en Venezuela; comentarios en relación a su impacto sobre la apicultura y salud pública. Venezuela. Dirección General de Desarrollo Ganadero. Técnicas y prácticas apícolas no. 5. 1978. 16 p. (199)

\_\_\_\_\_. Erradicación o control genético de la abeja africanizada. In Congreso Venezolano de Entomología, 4°, Maracay, Venezuela, 1979. Resúmenes. Maracay, Venezuela, Sociedad Venezolana de Entomología, 1979. p. 17. (200)

GONÇALVES, L.S. Análise genética do cruzamento entre *Apis mellifera ligustica* e *Apis mellifera adansonii*. Escolha e análise genética de caracteres morfológicos da cabeça e do tórax. Tesis Dr. Ribeirão Preto, Brasil, Faculdade de Medicina de Ribeirão Preto, 1970. 142 p. (201)

\_\_\_\_\_. et al. Relatório final do grupo americano sobre a abelha africana. In Congresso Brasileiro de Apicultura, 2°, Sete Lagoas, Brasil, 1972. *[Anais]*. Curitiba, Brasil, Associação Mineira de Apicultores, 1972. pp. 211-268. (202)

\* \_\_\_\_\_ . Comments on the aggressiveness of the Africanized bees in Brazil. *American Bee Journal* 114(12):448-450. 1974. (203)

The final article describes research aimed to reduce the aggressiveness of Africanized bees by crossing them with more gentle strains. (*Apicultural Abstracts* 26(3):733. 1975).

\* \_\_\_\_\_ . The introduction of the African bees (*Apis mellifera adansonii*) into Brazil and some comments on their spread in South America. *American Bee Journal* 114(11):414-415, 419. 1974. (204)

The author reviews the history of the introduction of *Apis mellifera adansonii* to Brazil and the subsequent spread of "Africanized bees". He disputes whether they have spread to north Amazonas, since many reports have mistakenly referred to wasps and queen bumble bees as Africanized bees. Research by various authors on aggressiveness is summarized. (*Apicultural Abstracts* 26(3):733. 1975).

- \* GONÇALVEZ, L.S. Do the Africanized bees of Brazil only sting? *American Bee Journal* 115(1): 8-10, 24. 1975. (205)

The aggressiveness, activity and honey production of Africanized bees in S. America are discussed. It is suggested that in aggressive colonies the queen should be replaced by *ligustica* strain in order to obtain a hybrid race which is gentle, while retaining high activity and a good honey yield. (*Entomology Abstracts* 6: 8758. 1975).

- \* \_\_\_\_\_ y STORT, A.C. Honey bee improvement through behavioral genetics. *Annual Review of Entomology* 31:197-213. 1978. (206)

Incluye *Apis mellifera adansonii*.

- \_\_\_\_\_. Impacto causado por las abejas africanizadas en la América del Sur. *Gaceta del Colmenar (Argentina)* 40(460):474-482. 1978. (207)

- \* \_\_\_\_\_., MORSE, R.A. y STORT, A.C. Incidence of the *Varroa jacobsoni* acarid in Africanized bee colonies in the state of Sao Paulo, Brazil (En alemán). In *International Congress of Apiculture, 27th, Athens, 1979. Proceedings.* Bucharest, Romania, Apimondia Publishing House, 1980. pp. 374-378. (208)

- \_\_\_\_\_. Recent information on the Africanized bees in Brazil. *Apiacta Int. Tech. Mag. Apic. Econ. Inf.* 17(2):58, 60. 1982. (209)

- \* GONZALEZ M., O. Capacitación para el manejo de la abeja africana. *Semanario Universidad, San José; Feb. 25-Mar. 3, 1983:5.* (210)

Con el fin de erradicar conceptos erróneos sobre la temible abeja africana, se está preparando un curso sobre el manejo de la abeja que se llevará a cabo en la Universidad de Costa Rica, durante la primera semana de marzo de 1983.

- \* GORE, R. Those fiery Brazilian bees. *National Geographic* 149(4):490-501. 1976. (211)

- \* Publicado también en español en: *Revista Cafetera de Colombia* 27(168): 44-50. 1976.

Este artículo describe el caracter agresivo de la abeja africanizada y presenta casos trágicos de ataques de este insecto en Brasil.

- \_\_\_\_\_. Those wild Brazilian honey bees. *Gaceta del Colmenar (Argentina)* 40(2):68-70, 72, 74, 76. 1978. (212)

- GRAFFINI, V.B. Interesting documentary (*Apis mellifera adansonii*). *Gaceta del Colmenar (Argentina)* 35(12):384, 386. 1973. (213)

- \* HALLIM, M.K.I. The Africanized bees in Trinidad and Tobago. *Extension Newsletter - University of the West Indies. Dept. of Agricultural Extension (Trinidad & Tobago)* 10(4):15-19. 1979. (214)

The Africanized bee (AB) is a hybrid bee resulting from a cross between the South African bee (*Apis mellifera scutellata*) and European races of honeybees. In 1956 the African honeybee was introduced into Brazil in an attempt to breed a higher producing

honeybee. One year later, 26 swarms of bees escaped and started crossbreeding with the local European bees resulting in the highly aggressive AB. Within a period of 23 years the AB has spread throughout most of South America and has reached Trinidad. Characteristics of the AB, especially its aggressiveness (after disturbance, the AB can remain aggressive for more than 30 min. chasing an intruder for a distance of up to about 1 km.), and its taking over European hives by killing the European queen and establishing an Africanized queen are described. Control measures are discussed.

- \* GRAHAM, J. Africanized bees stir adverse public reaction. *American Bee Journal* 121(9): 669-670. 1981. (215)

Este artículo presenta diversas reacciones del público ante la abeja africanizada, promovida en gran parte por los medios de comunicación.

- \* LA GRAN invasión de las abejas. *Boletina (Argentina)* no. 92:550-551. 1975. (216)

Las agresivas abejas "africanas" siguen ganando terreno en América del Sur, siendo observado atentamente su desplazamiento por los técnicos de los países del centro y del norte de América.

- \* GROUT, R.A. The African bee in Brazil - a review. *American Bee Journal* 108(8):318-319. 1968. (217)

- GUY, R.D. How does the Brazilian bee compare to South African bees? *South African Bee Journal* 44(6):9. 1972. (218)

- \_\_\_\_\_. *Apicultura comercial com abelhas africanas*. *As Abelhas* 16(183):10-12. 1973. (219)  
También en: *Bee World* 53(1):14-22. 1972.

- \_\_\_\_\_. Commercial beekeeping with *Apis mellifera adansonii* in intermediate and movable-frame hives. In Crane, E., ed. *Apiculture in tropical climates*. London, International Bee Research Association, 1976. pp. 31-37. (220)

- HACCOUR, P. Some reflections on the *adansonii* bee. *Abeille Fr. Apicul.* 602:63-64. 1977. (221)

- \* HALLIM, M.K.I. The presence of the Africanised bee. *Journal of the Agricultural Society of Trinidad and Tobago* 80(4):333-335, 337-340, 342-345, 347-349. 1980. (222)

Se informa sobre la presencia de la abeja africanizada en Trinidad detectada en 1980 y los ataques que sufrieron algunas personas durante ese año. Suministra datos sobre la ubicación y número de colmenas destruidas, además de los problemas asociados con la presencia de esta abeja en Trinidad y las medidas tomadas por el gobierno para solucionarlos.

- \* HARBO, J.R. et al. Development periods for eggs of Africanized and European honeybees. *Journal of Apicultural Research* 20(3):156-159. 1981. (223)

In a side-by-side test in Venezuela, 593 eggs from 7 Africanized queen honeybees and 355 eggs from 7 European queens (from USA) were

kept in an incubator ( $35 \pm 1^\circ\text{C}$ ) without adult bees. Eggs from the two groups hatched after  $69.6 \pm 1.06$  h and  $73.3 \pm 1.14$  h, respectively ( $\bar{x} \pm \text{SD}$ ), indicating a basic physiological difference between development periods for eggs from the two populations.

HARNAJ, V. La abeja *adansonii*, un nuevo objetivo que necesita la cooperación en el marco de Apimondia. *Apiacta* 8(3):97-98. 1973. (224)

HARPER, J.D. Africanized bee has spread into Ecuador. *Speedy Bee* 11(1):7-8. 1982. (225)

HAUCK, E. [Case of *Apis mellifera adansonii* in South America]. *Allg. Dtsch. Imkerztg* 8(1):7-9. 1974. (226)

\* HEINRICH, B. Thermoregulation of African and European honeybees during foraging, attack, and hive exits and returns. *Journal of Experimental Biology* 80:217-229. 1979. (227)

While foraging, attacking, or leaving or returning to their hives, both the African and European honeybees maintained their thoracic temperature at  $30^\circ\text{C}$  or above, independent of ambient temperature from  $7$  to  $23^\circ\text{C}$  (in shade).

Thoracic temperatures were not significantly different between African and European bees. Thoracic temperatures were significantly different during different activities. Average thoracic temperatures (at ambient temperatures of  $8$ - $23^\circ\text{C}$ ) were lowest ( $30^\circ\text{C}$ ) in bees turning to the hive. They were  $31$ - $32^\circ\text{C}$  during foraging, and  $36$ - $38^\circ\text{C}$  in bees leaving the hive, and in those attacking. The bees thus warm up above their temperature in the hive ( $32^\circ\text{C}$ ) before leaving the colony.

In the laboratory the bees (European) did not maintain the minimum thoracic temperature for continuous flight ( $27^\circ\text{C}$ ) at  $10^\circ\text{C}$ . When forced to remain in continuous flight for at least 2 min., thoracic temperature averaged  $15^\circ\text{C}$  above ambient temperature from  $15$  to  $25^\circ\text{C}$ , and was regulated only at high ambient temperatures ( $30$ - $40^\circ\text{C}$ ).

At ambient temperatures  $>25^\circ\text{C}$ , the bees heated up during return to the hive, attack and foraging above the thoracic temperatures they regulated at low ambient temperatures to near the temperatures they regulated during continuous flight.

In both African and European bees, attack behaviour and high thoracic temperature are correlated. The data suggest that the bees regulate thoracic temperature by both behavioural and physiological means. It can be inferred that the African bees have a higher metabolic rate than the European, but their smaller size, which facilitates more rapid heat loss, results in similar thoracic temperatures.

HENNESSY, T. O killer bee where is they sting? In the press, that's where. *American Honey Prod.* 8(4/6):17-19. 1976. (228)

- \* HEPBURN, H.R., CHANDLER, H.D. y DAVIDOFF, M. Extensometric properties of insects fibroins: the green lacewing cross- $\beta$ , honeybee  $\alpha$ -helical and greater waxmoth parallel- $\beta$  conformations. *Insect Biochemistry* 9(1):69-77. 1979. (229)

The extensometric properties of insect silks of three different crystallographic conformations (from *Chrysopa carnea* Steph., *Apis mellifera adansonii* Latr. and *Galleria mellonella* (L.) are discussed in terms of their true stress-strain characteristics on tensile deformation in different aqueous media. These mechanical data are interpreted in terms of the phase transformations associated with conformational change and with microfibrillar structure. (Review of Applied Entomology, A 67(7):2551. 1979).

- \_\_\_\_\_, et al. Metabolism of carbohydrate, lipid and protein during development of sealed worker brood of the African honeybee. *Journal of Apicultural Research* 18(1):30-35. 1979. (230)

The relative amounts of carbohydrate, lipid and protein were determined in whole bees over the course of their development in the sealed cell. Oxygen uptake, respiratory quotients, and changes in wet and dry weight were determined. Metabolism of sealed larvae, pupal and young pharate adults is based on the utilization of lipid stores but in older pharate adults it also involved the consumption of some protein. Carbohydrate might be used primarily in the deposition of the adult cuticle prior to emergence. (*Apicultural Abstracts* 30(4):1329. 1979).

- \_\_\_\_\_. Comb construction by the African honeybees, *Apis mellifera adansonii*. *Journal of the Entomological Society of South Africa* 46(1):87-101. 1983. (231)

Cell size discrimination by *A.m. adansonii* was investigated using beeswax foundation having a range of cell sizes from 170 to 1022 cells/dm<sup>2</sup>. Different construction solutions and different working tolerances were measured from combs built in queenright colonies. The major variable in comb building is that of wall thickness, with the walls of combs built on foundation only half as variable as those of naturally built comb. The largest cell size that the bees would consistently draw was found to be about 493 cells/dm<sup>2</sup>. Honey/wax ratios for honey combs established on 493 cells/dm<sup>2</sup> were compared with those obtained from the traditional 1022 cells/dm<sup>2</sup>. These cell types differ significantly in the amount of wax required to contain in effect, the same amount of honey. (*Entomology Abstracts* 14(7):4705. 1983).

- HESSE, B. Ovarian development and egg-laying in workers of different races of *Apis mellifera*. In Meeting of the Work Group of the Bee Research Institutes of West Germany, Muenster, West Germany, 1978. *Apidologie* 10(1):67-68, 83-84. 1979. (232)

Incluye *A.m. adansonii*.

- \* INFORMATION ON honey bees in South America. *American Bee Journal* 115(8):304. 1975. (233)

Este artículo informa sobre la dispersión de la abeja africanizada en Brasil. Se estima que tomará a estos insectos 20 años llegar a los Estados Unidos. Se indica además que en algunas partes de Brasil los híbridos mejorados tienen alta productividad y no causan problema a los apicultores.

- \* INICIAN EXTERMINIO de la abeja africanizada. La Nación, San José; Set. 4, 1983:19A. (234)

Se informa sobre el inicio del programa de exterminio de la abeja africanizada por la Comisión Nacional de Apicultura de Costa Rica.

- \* JARAMILLO, C.J. y GARCIA, L.A. Manejo de la abeja africanizada. In Seminario Técnico sobre Abeja Africanizada, 1°, Bogotá, Colombia, 1979. Memorias. IICA. Informes de Conferencias, Cursos y Reuniones, no. 190. 1979. pp. 14-40. (235)

Contiene las observaciones efectuadas en varios estados de Brasil sobre la identificación, aspectos biológicos de la abeja africanizada, normas de manejo en cuanto a la selección de sitios para la instalación de apiarios y uso de medios y equipos para controlar la agresividad; captura de enjambres, recolección y beneficio de la miel y manejo de la colmena.

- JAUNZARAS, H.J. La abeja africana y su presencia en la República Argentina. Tesis Ing. Agr. Buenos Aires, Argentina, Universidad de Buenos Aires, 1976. 66 p. (236)

- \* JAY, S.C. Factors influencing ovary development of worker honeybees of European and African origin. Canadian Journal of Zoology 53(10):1387-1390. 1975. (237)

The effect of the presence of a queen, pollen feeding, and the presence of worker comb on ovary development of worker bees of European and African origin were assessed after they had been caged for 10 days. There was no significant difference in ovary development of workers of European and African origin. The presence of worker comb appeared to stimulate ovary development in workers in cages without queens when pollen was present, or absent, in the diet. No eggs were found in any of the cages.

- \* JAYCOX, E.R. Does entomology need a boogeyman? Bulletin of the Entomological Society of America 22(2):131-132. 1976. (238)

- JOHANNSMIER, M.F. Corbicular loads of the African honeybee. South African Bee Journal 53(5):3-6. 1981. (239)

In a 3-year study, the contents of pollen traps on hives in 14 localities were analysed; in 187 samples, each consisting of about 500 pellets, the percentage of mixed pellets was 0-10.2% (average 0.7%).

During two weeks of intensive brood rearing, the pollen collections of 3 colonies in one apiary were compared; in the first week the main pollen sources used by each colony were different, except that 2 colonies collected *Hasminum* pollen. In the second week 2 of the colonies switched to quite different pollen sources. Pollen samples contained some propolis in the first week - 34% in one colony and 3% in the other - but none the next week. At another apiary, less marked differences were found in the pollen collected.

Other substances found in pollen traps were probably collected as pollen (or propolis) substitutes; also found was "manna", sugar pellets collected from wound in *Eucalyptus viminalis*. (Apicultural Abstracts 33(4):1248. 1982).

- JOHANSEN, C. Brazilian bee. Washington State University. Cooperative Extension Service  
EM Coop. Ext. Serv. Coll. Agric. Washington State University no. 3997. 1975. 2 p. (240)
- JOHANSSON, T.S.K. y JOHANSSON, M.P. Handling bees. Bee World :47-50. 1976. (241)
- KATZENELSON, M. Algo más sobre la indeseable abeja africana. Gaceta del Colmenar (Argentina)  
29(326):212-215. 1967. (242)
- \_\_\_\_\_. Las abejas africanas en el norte argentino. Gaceta del Colmenar (Argentina)  
31(350):182-187. 1969. (243)
- \* \_\_\_\_\_. An Argentine bee firm maintains Italian bees in a region dominated by African  
bees. American Bee Journal 111(11):422-423. 1971. (244)
- KEMPFER MERCADO, M. Las abejas africanas, como problema de la apicultura americana. Gaceta  
del Colmenar (Argentina) 30(338):167-169. 1967 (245)
- Presentado en: Congreso Latinoamericano de Apicultura, 1°, La Plata,  
Argentina, 1968.
- \_\_\_\_\_. El gas hilarante en el control de las abejas africanas. Revista de la Universi-  
dad Autónoma "Gabriel René Moreno" no. 30: 1968. (246)
- \_\_\_\_\_. Contribución a la solución del problema de las abejas africanas. Gaceta del Col-  
menar (Argentina) 31(356):358-361. 1969; 33(371):87-92; 33(372):124-126. 1971. (247)
- \_\_\_\_\_. Abejas africanas. Gaceta del Colmenar (Argentina) 35(6):176. 1973. (248)
- \_\_\_\_\_. Abejas africanas; contribución a su conocimiento. Santa Cruz, Bolivia, Minis-  
terio de Agricultura y Ganadería, 1973. 22 p. (249)
- También en: Gaceta del Colmenar (Argentina) 35(398):176, 178, 180,  
182-183, 185, 187; 35(399):210, 212, 214. 1973.
- \_\_\_\_\_. Productivity of African bees (En español). Gaceta del Colmenar (Argentina)  
35(401):284. 1973. (250)
- KERR, W.E. Introdução de abelhas africanas no Brasil. Brasil Apícola 3(5):211-213. 1957. (251)
- \_\_\_\_\_. y ARAUJO, V.P. DE. Raças de abelhas de Africa. García de Orta 6(1):53-59. 1958. (252)
- \_\_\_\_\_. The history of the introduction of African bees to Brazil. South African Bee  
Journal 39:3-5. 1967. (253)
- También en: Apic. West. Australia 2:53-55. 1967.
- \* \_\_\_\_\_. Solução é criar uma raça nova. Guia Rural (Brasil) 1966/67:20-22. 1967. (254)

KERR, W.E. et al. Biología comparada entre as abelhas italianas (*Apis mellifera ligustica*), africana (*Apis mellifera adansonii*) e suas híbridas. In Congresso Brasileiro de Apicultura, 1º, Florianópolis, Brasil, 1970. [Anais]. s.l., s.e., 1970. pp. 151-185. (255)

\* \_\_\_\_\_ y BUENO, D. Natural crossing between *Apis mellifera adansonii* and *Apis mellifera ligustica*. *Evolution* 24(1):145-148. 1970. (256)

Twenty *Apis mellifera adansonii* (African) queens and 21 *A. mellifera ligustica* (Italian) queens were allowed to take nuptial flights in an area which had been provided with 500 drones of each subspecies. An estimate indicates that an average of 7.5 males inseminated each African queen and 5.3 males inseminated each Italian queen. No advantage of African males over Italian males was observed in the total numbers of drones involved in the inseminations. However, African queens were inseminated by African drones in 58.5% of inseminations, and Italian queens were inseminated by Italian drones in 64.8% of cases. This selective mating indicates that an isolation mechanism has been partially established in the period since the Sahara desert became a natural barrier (less than 11,000 years).

\_\_\_\_\_. Bee genetics in Brazil. Newsletter from U.C. Apiaries 1981:3-8. 1981. (257)

\* \_\_\_\_\_, LEON DEL RIO, S. DE y DARDO BARRIONUEVO, M. Distribuição da abelha Africanizada em seus limites ao Sul. *Ciência e Cultura (Brasil)* 34(11):1439-1442. 1982. (258)

Esta nota indica qual é a presente distribuição geográfica das abelhas africanizadas. Essa distribuição inclui as duas introduções recentes; no México (1976) e na Venezuela (1974). Registra, também, que na América do Sul a abelha africanizada desde 1970 atingiu o limite sul.

\* \_\_\_\_\_, LEON DEL RIO, S. DE y DARDO BARRIONUEVO, M. The Southern limits of the distribution of the Africanized honey bee in South America. *American Bee Journal* 122(3):196, 198. 1982. (259)

The authors concluded that since 1968, that is, 12 years ago, the Africanized bee arrived in the Southern part of the South American Continent up to the 33rd and 34th parallel, which has been the absolute natural limit of its distribution. Occasional incursions to the south may be made during the hot months (November, December, January, and February), but because of the winter, the wind, and the rain, the colonies either die out or migrate to the north. It is known that the African bee does not make winter clusters (J. Woyke, personal communication), which may be the behavioral factor that limits its movement to the south.

In Africa, the limit of the distribution of *A.m. adansonii* is the southern part of the Kalahari and Carroo deserts (30°S), which leaves the province of the Cape of Good Hope for *A. mellifera capensis* (Kerr and Araujo, 1958), which in that region interacts with *A.m. adansonii* as if it were a distinct species, that is, with complete reproductive isolation.

KOENIGER, N. Interspecific competition between *Apis florea* and *Apis mellifera* in the Tropics. *Bee World* 57(3):110-112. 1976. (260)

KOUCKY, R. Miombo. *Včelárstvi* 33(10):232-233. 1980. [Apis m. adansonii] (261)



KURLETTO, S. Cruzamento das abelhas Africanizadas com as carnicas. In Congresso Brasileiro de Apicultura, 3º, Piracicaba, Brasil, 1974. Anais. Ed. por L.S. Gonçalves. Ribeirão Preto, SP, Brasil, Fac. Medicina, Dept. Genética, 1975. pp. 161-164. (262)

Forty-five colonies of *Apis mellifera carnica* from Araucária were used to produce queens, whilst 37 colonies of *A.m. adansonii* from Campo Redondo (5 km. from Araucária) furnished drones. After 3 generations of hybridization and selection, the descendants of hybrid queens showed good productivity, reduced aggression, good resistance to diseases, and low swarming tendencies. (Apicultural Abstracts 28(4):1274. 1977).

\_\_\_\_\_. Guided pollination with Africanized honeybees. Apic. Clim. Quente Api. Hot. Clim. 1979:225-228. 1979. (263)

\* LAIDLAW, H.H. The importation of semen from Brazil into California. American Bee Journal 117(3):153. 1977. (264)

Este artículo expone los resultados obtenidos con el cruzamiento utilizando semen de *Apis adansonii* y abejas italianas. El autor recomienda recurrir a la genética y al manejo de este insecto que actualmente están realizando en California para solucionar cualquier problema eventual que pueda presentarse.

\* LAMBERTI, J.R. y CORNEJO, L.G. Toxicidad del veneno de *Apis mellifera*, en sus distintas subespecies. Ciencia y Abejas (Argentina) 2(7):11, 13-17, 19-20, 22-24. 1974. (265)

Incluye *Apis mellifera adansonii*

Los autores se proponen realizar algunas consideraciones sobre los accidentes que se pueden presentar en el colmenar, la manera de evitarlos; además, indican las medidas a tomar en los distintos casos y el botiquín mínimo que se debe disponer en un apiario para lograr un primer auxilio efectivo.

LASZLO, S. Undreamed success in Africa. (Apiculture, *Apis adansonii*, *punica*, *Apis ligustica*). Gleanings in Bee Culture 100(11):332, 345. 1972. (266)

\* LAVIGNE, G.L. Sobre a presença das abelhas africanas (*Apis mellifera adansonii*) na Bahia, Brasil. Boletim do Instituto Biológico da Bahia (Brasil) 8(1):20-24. 1970. (267)

O autor registra a presença das abelhas africanas (*Apis mellifera adansonii*) no Estado da Bahia, Brasil, analisando suas consequências. Relata, também, resumidamente, o histórico das abelhas do genero *Apis* no Brasil.

\* LEHNERT, T., MICHAEL, A.S. y LEVIN, M.D. Disease survey of South American africanized bees. American Bee Journal 114(9):338. 1974. (268)

Nosema (Protozoa) disease was found in 14 of 26 samples from Brazil. Heavy infestations of *Acarapis woodi* (Acari) occurred in 3 of the samples. This could cause problems in the event of Africanized bees being brought from Brazil to the USA. (Entomology Abstracts 6:2602. 1975).

LEMOS, M.V.F. y MACHADO, J.O. Caracterização da microflora bacteriana normal de geléia real, larvas, pré-pupas, pupas, imagos, mel e pólen da abelha *Apis mellifera adansonii*. In Congresso Brasileiro de Apicultura 3º, Piracicaba, SP, Brasil, 1974. Anais. Ed. por L.S. Gonçalves. Ribeirão Preto, SP, Brasil, Fac. Medicina, Dept. Genética, 1975. pp. 191-198. (269)

Attempts were made to isolate bacteria from *A.m. adansonii* larvae, pupae and prepupae, and from the intestines of adults, using a method slightly modified from that of Gilliam. No bacteria were isolated from prepupae; 90% of larvae, pupae and adults were also sterile. Details of nutritional requirements and Gram staining are given for the bacteria found in larvae 3 and 6 days old. Six types of bacteria and one yeast were found in pollen and two types of bacteria in honey. No micro-organisms were found in royal jelly. It is concluded that no symbiotic relationship with micro-organisms exists during the life cycle of *A.m. adansonii*, up to emergence of adults. (Apicultural Abstracts 28(4):1192. 1977).

LENGLER, S. Effect of drone comb on honey production of Africanized honeybees. *Apic. Clim. Quente Api. Hot. Clim.* 1979:181-182. 1979. (270)

LEONARD, M. The deadly African honeybee: heading our way? *National Observer* 1974:13. 1974. (271)

LEVIN, M.D. La táctica adoptada por el USDA. *Apiacta* 8(3):108. 1973. (272)

\* \_\_\_\_\_ . Activities of the USDA relating to bee problems in Brazil - a summary. *American Bee Journal* 114(11):418. 1974. (273)

También en español en: *Apiacta* 10(2):87-88. 1975.

Se presenta un resumen sobre las recomendaciones presentadas por el autor al Departamento de Agricultura de los Estados Unidos, las cuales junto a las ofrecidas por el Comité que estudió la abeja africanizada, originaron la toma de medidas para enfrentarse al potencial problema de la presencia de este insecto en los Estados Unidos.

\* \_\_\_\_\_ . Hybridization of honey bees in South America (*Apis mellifera adansonii*). *Bulletin of the Entomological Society of America* 20(4):294-296. 1974. (274)

En este trabajo se ofrece corta historia sobre la introducción de la abeja africanizada a Brasil y las recomendaciones presentadas por el Comité Técnico nombrado por la Academia Nacional de Ciencias de los Estados Unidos, algunas de las cuales han sido debidamente implementadas por el gobierno de este país.

El autor confirma las opiniones del Comité Técnico, después de haber realizado un viaje a Brasil. También informa sobre el impacto de la abeja africanizada en las poblaciones de abejas residentes en Brasil y las medidas inmediatas que deberían tomar los gobiernos para enfrentarse a este insecto.

- \* LISTO PLAN ante inminente llegada de abeja asesina. La Nación, San José; Marzo 21, 1982:2A.  
(275)

Se informa sobre el plan de acción para disminuir el efecto de las abejas africanas en Costa Rica preparado por el Ministerio de Agricultura en coordinación con el Ministerio de Educación, Instituto de Tierras y Colonización (ITCO), Universidad de Costa Rica (UCR) y Universidad Nacional (UNA), tendiente a cruzar estas abejas con reinas locales de alta fecundidad para lograr un híbrido menos agresivo.

- \* LOCALIZARON PRIMERAS abejas africanizadas en Costa Rica. La Nación, San José; Abril 22, 1983:6A.  
(276)

Se confirma la presencia de la abeja africanizada en San Isidro de Pérez Zeledón, al sur de Costa Rica. Describe brevemente su apariencia física.

- \* LOURENCO, T.A.C. In spite of the African bees, beekeeping prospers in Brazil. American Bee Journal 122(12):799-800. 1982.  
(277)

LYON, W.F. My experience with the African honey bee. Gleanings in Bee Culture 102(11):335-336. 1974.  
(278)

- \* MCGREGOR, S.E. The African bee and American beekeeping. American Bee Journal 110(12):460-461. 1970.  
(279)

- \* MADRIGAL, M. Científicos ticos listos contra abejas asesinas. La Prensa Libre, San José; Feb. 9, 1982:8.  
(280)

Brinda detalles sobre la evolución de las abejas africanas y las medidas que deben tomarse ante su llegada a Costa Rica. El señor William Ramírez, investigador de la Universidad de Costa Rica manifiesta que estas abejas no son asesinas (término distorsionado por los medios de información) sino que es de carácter defensivo. Ofrece alternativas para hacerle frente y brinda recomendaciones y métodos curativos y de prevención.

- \* MAG SOSPECHA que ya entró al país abeja africanizada. La Nación, San José, Abril 5, 1983:6A.  
(281)

Se informa sobre la posibilidad de la llegada a Costa Rica de la abeja africanizada debido a las características de algunos enjambres aparecidos en la zona sur.

MARTIN, E.C. Can the African bee be stopped in Brazil? American Bee Journal 113(8):291. 1973.  
(282)

\_\_\_\_\_. Answers to question about Africanized bees. American Bee Journal 118(8):532, 560. 1978.  
(283)

MARTINEZ CANCIO, R. Comportamiento de los híbridos de *Apis m. ligustica*, *caucásica* y *carnica* con *Apis m. adansonii* en Santiago del Estero, República Argentina. Gaceta del Colmenar (Argentina) 37(418):66-67. s.f.  
(284)

MAX, A. How to manage the African bees. *American Bee Journal* 112(2):60. 1972. (285)

\* \_\_\_\_\_ . Combate à abelha africana. *Lavoura (Brasil)* 78:14-15. 1975. (286)

Depois de analisar as causas do declínio da produção brasileira de mel de abelhas, o autor estudou e experimentou a criação de abelhas mansas européias (Italianas) prevenindo a reinfestação das abelhas *Apis mellifica adansonii* (Africana) utilizando as abelhas campeiras desses enxames agressivos para reforçar colmeias de abelhas européias a fim de provocar-lhes desenvolvimento mais rápido enquanto aniquila a africana, finalizando por eliminá-la empregando um sistema de troca das colméias de lugar.

\* MELLO, M.S.L. A qualitative analysis of the proteins in venoms from *Apis mellifera* (including *Apis mellifera adansonii*) and *Bombus atratus*. *Journal of Apicultural Research* 9(3): 113-120. 1970. (287)

Protein patterns of the venoms of *Apis mellifera adansonii* Latr., *A.m. ligustica* Spin. and *Bombus atratus* Franklin were analysed by paper, starch-gel and acrylamide electrophoresis. In the case of *A.m. adansonii* and *A.m. ligustica*, ten similar protein bands were revealed by disc electrophoresis, but the proteins in the venom of *B. atratus* were found to have properties different from those of *A. mellifera*. (*Review of Applied Entomology*, B 62(9):2340. 1974).

\_\_\_\_\_. Influence of some cytochemical methods on birefringence on honey bee sperm nuclei (*Apis mellifera adansonii*: Hym., Apidae). *Acta Histochem* 47(2):266-272. 1973. (288)

Variations in the patterns of dispersion of birefringence were studied in sperm nuclei subjected to different fixatives, staining and denaturation-reassociation procedures. Formalin fixation discloses many sequential DNA phosphate groups in a helicoidal orientation endowing the nuclei with anomalous dispersion of birefringence. Carnoy's fixation, like the blockage of most DNA phosphates (unattached to proteins) by  $Ba^{++}$  cations added to the toluidine blue solutions at pH = 3-4, induces the appearance of patterns of normal dispersion of birefringence. The sperm chromatin remains metachromatic and birefringent even after denaturation-reassociation procedures, irrespective of the fixative used (formalin or Canoy's) which is assumed as a special resistance of the DNA-nucleoprotein complex to denaturation or to solubilization of the denatured parts besides the possibility of a special membrane structure preventing the exit of the dissociated material. (*Entomology Abstracts* 5:4162. 1974).

MICHENER, C.D. Nest sites of stem and twig inhabiting African bees (Hymenoptera: Apoidea). *Entomol. Soc. Southern Afr. Journal* 33(1):1-22. 1970. (289)

\_\_\_\_\_. Report of the Committee on the African honey bees. Springfield, Va., National Technical Information Service, 1972. p. irr. (290)

\_\_\_\_\_. The Brazilian honeybee. *Bioscience* 25(9):523-527. 1973. (291)

A review is presented of the origin of the Brazilian race (ex *A.m. adansonii*), abundance, stinging, activeness, future spread, and potential impact in N. America. 2 problems briefly discussed

are: (a) the reasons for the difference in tractability between the Brazilian bee of N. Brazil and that of S. Brazil, and (b) why *A.m. adansonii* has not replaced European bees in S. Europe and N. Africa.

The conclusions reached are as follows: The Brazilian bee is a population of *A. mellifera* with many attributes of its African antecedents but with variable amounts of European ancestry. Noteworthy is its ability to develop large feral populations and unusual aggressiveness. The Brazilian bee replaces European bees in areas where it occurs. Improved strains of Brazilian bees sufficiently tractable to be a commercial value and better adapted to subtropical conditions than are European bees appear to be originating in S. Brazil. But the forms spreading northward through equatorial Brazil are thoroughly undesirable. As there is no obvious barriers to northward spread, the latter may come to affect the beekeeping and pollination industries and out-of-door enjoyments in the southern USA. Ordinary chemical or biological insect control methods cannot be used. A desirable form like that now appearing in S. Brazil requires to be developed. With its modification of any northward migration of highly aggressive bees should be possible. (Entomology Abstracts 5:2521. 1975).

\* MICHENER, C.D. The Brazilian honeybee - possible problems for the future. *Clinical Toxicology* 6(1):125-127. 1973. (292)

An African race (*Apis mellifera adansonii* Latr.) of the common honey bee was introduced into apiaries in Brazil in 1956 for the purpose of developing a strain of bees adapted to the tropics by crossing them with European bees. Twenty-six queens and their accompanying workers escaped in 1957, and since that time the African bee and its hybrid, known as the Brazilian honey bee, have spread into most parts of Brazil and the warmer parts of all the adjacent countries to the south and south-west. Throughout this area they have eliminated the European honey bee through hybridisation and competition. Brazilian bees are spreading northwards at a rate of some 200 miles/year, and there is no obvious barrier that would prevent them from reaching the United States in 10-15 years. They are more aggressive than the European bee and build up larger populations, and reports of mass stings and the deaths of man and domestic animals are more common where they are present. It is suggested that the most likely method of preventing them reaching the United States would be to develop and liberate a relatively non-aggressive strain that would compete effectively with them. (Review of Applied Entomology, B 62(9):2337. 1974).

\_\_\_\_\_. The Brazilian bee (*Apis mellifera adansonii*) problem. *Annual Review of Entomology* 20:399-416. 1975. (293)

A review on the history, present status and characteristics of "Africanized" *Apis mellifera* is presented. (Entomology Abstracts 8:4144. 1977).

MIDDLETON, C.R. *Adansonii's* possible migration. *British Bee Journal* 103(4343):66-67. 1975. (294)

- \* MOLINA PARDO, A. Razas de la abeja *Apis mellifera* L. [Medellín, Colombia], 1977? 4 p. (295)

Se describe las características de las principales razas de *Apis mellifera* del grupo europeo existentes en el continente americano. Incluye cuadro con indicación de grupos europeos, orientales y africanos con sus correspondientes razas o sub-especie y distribución geográfica original.

- \* \_\_\_\_\_, CALDERON, M. y VARELA, F. Avance de la abeja africanizada en territorio colombiano. In Seminario Técnico sobre Abeja Africanizada, 1°, Bogotá, Colombia, 1979. [Memorias]. IICA. Informes de Conferencias, Cursos y Reuniones, no. 190. 1979. pp. 86-93. (296)

Se realizó un reconocimiento de la zona de Carimagua, Meta, Colombia en el año 1979, con la finalidad de detectar la presencia de abeja africanizada. Los resultados indicaron que en la zona no existe *Apis mellifera*. Incluye mapa con la indicación del probable avance de la abeja en la frontera Colombo-Venezolana y recomendaciones a seguir ante la presencia de la abeja en el país.

- \_\_\_\_\_. La abeja africanizada: algunos aspectos sobre su origen, biología y manejo. Medellín, Colombia, Universidad Nacional de Colombia, 1979. 40 p. (297)

Presentado en: Congreso Sociedad Colombiana de Entomología SOCOLEN, 5°, Cali, Colombia, 1979.

- MORAES, R.L.M.S. DE y CRUZ-LANDIM, C. DA. Ultraestrutura da glandula salivar larval de *Apis mellifera adansonii* (Hymenoptera-Apidae). In Congresso Brasileiro de Apicultura, 3°, Piracicaba, Brasil, 1974. Anais. Ed. por L. S. Gonçalves. Ribeirão Preto, SP, Brasil, Fac. Med., Dept. Genética, 1975. pp. 145-152. (298)

Studies of the 2nd and 5th larval instars showed that although the structural features of the duct cells were the same, the type of (protein) secretion differed according to instar. (Apicultural Abstracts 28(4):1198. 1977).

- \* MORALES M., E. La abeja africana podría invadir a América Central. Agroindustria (Costa Rica) 3(18):7-8. 1974. (299)

Ofrece información sobre las características indeseables y ventajosas de la abeja africanizada como mejor productora de miel y los programas cuarentenarios a seguir para impedir su avance hacia Costa Rica y demás países de América Central y Norteamérica.

- \* MORSE, G.D. The African bee of South America. Gleanings in Bee Culture 105(8):338-339. 1977. (300)

Although it appears likely that the Africanized bee of South America may reach this country by way of wild swarms in 13-20 years, there is considerable uncertainty of the number that may arrive, and of the degree to which it may have become hybridized by that time.

- MORSE, R.A. Some observations on beekeeping in Brazil. Gleanings in Bee Culture 101(3):70-72. 1973. (301)

- MORSE, R.A. The Entomological Society meetings in Texas (The African bee). Gleanings in Bee Culture 102(2):51. 1974. (302)
- \* \_\_\_\_\_, et al. Early introductions of African bees into Europe and the New World. American Bee Journal 115(8):302-303. 1975. (303)
- También en: Bee World 54(2):57-60. 1973.
- \* \_\_\_\_\_. I'm not afraid of African bees. American Bee Journal 116(1):15-16. 1976. (304)
- \_\_\_\_\_. Ovary development in African bees. Gleanings in Bee Culture 104(2):59. 1976. (305)
- \_\_\_\_\_. African bee in Mexico. Gleanings in Bee Culture 108:553. 1980. (306)
- \* MOUNTAIN, P. Honey production in South Africa (*Apis mellifera adansonii*, *Apis mellifera capensis*). American Bee Journal 112(11):408-410. 1972. (307)
- MULLER, V.A. et al. Amansamiento de poblaciones "africanizadas" de *Apis mellifera* en la zona centro-este del estado de Río Grande do Sul. Gaceta del Colmenar (Argentina) 40(8): 432, 434, 436-440. 1978. (308)
- Results of 9 years' experience in producing more manageable bees are summarized. Biometrical examination showed that the attempts to maintain the less "aggressive" characteristics of *Apis mellifera ligustica* were successful. This is what is referred to as amansamiento (taming). (Apicultural Abstracts 31(3):931. 1980).
- \* MURILLO, R. En torno a las abejas asesinas. La Nación, San José; Dic. 2, 1981:15A. (309)
- El artículo presenta una fábula histórica sobre las abejas africanizadas.
- \* MUXFELDT, H. Apicultura. Lavoura Arrozeira (Brasil) 29(290):46-47. 1976. (310)
- Se trata de minimizar el efecto negativo que ha ocasionado los órganos de divulgación sobre la abeja africanizada. Informa que los cruzamientos, técnicas y adaptación van disminuyendo la agresividad de la abeja.
- NATIONAL ACADEMY OF SCIENCES. Final report. Committee on the African bee. Washington, D.C., 1972. 95 p. (311)
- \* NOEL, K.M. Qué sabe usted sobre las abejas africanas. ICA Informa (Colombia) 10(4):5-8. 1975. (312)
- Se ofrece información sobre el comportamiento de la abeja africanizada, sus características biológicas y manejo.
- NOGUEIRA, R.H.F. y GONÇALVES, L.S. Estudo do ferrao de *Apis mellifera*. In Congresso Brasileiro de Apicultura, 3º, Piracicaba, Brasil, 1974. Anais. Ed. por L.S. Gonçalves. Ribeirão Preto, SP, Brasil, Fac. Med., Dept. Genética, 1975. pp. 111-117. (313)
- Measurements of total sting length, length of right and left lancets, and size of the acid glands, were made in workers 15 days old,

produced by crossing queens of *Apis mellifera adansonii*, *A.m. mellifera*, and *A.m. ligustica* with 3 or 4 sibling drones. Tables show differences between subspecies for the same character, and between pairs of characters within a subspecies. *A.m. adansonii* differed significantly from the European subspecies in all four characters. There was no significant difference between the European subspecies, and no correlation (1% level) between the characters in any subspecies. (Apicultural Abstracts 28(4):1197. 1977).

- \* NOGUEIRA, R.H.F. y GONÇALVES, L.S. Study of gland size and type in *Apis mellifera* workers emerged from drone cells. *Revista Brasileira de Genética* 5(1):51-59. 1982. (314)

Incluye *Apis mellifera adansonii*.

Comparando operárias desenvolvidas em células de zangão com aquelas desenvolvidas em células de operárias, verificamos que as primeiras são mais pesadas, possuem glândulas ácidas maiores e maior número de ovariolos em seus ovários. Entre-tanto, apesar da obtenção de indivíduos intermediários entre rainha e operária com relação ao número de ovariolos, não encontramos nas glândulas ácidas destes indivíduos as variações morfológicas que podem ser encontradas em cerca de 64% das glândulas das rainhas.

- \* \_\_\_\_\_ y GONÇALVES, L.S. A study of the morphological variations in the acid glands of *Apis mellifera* queens. *Revista Brasileira de Genética* 5(1):61-68. 1982. (315)

Incluye *Apis mellifera adansonii*.

Amplas variações morfológicas foram encontradas nas glândulas ácidas de 300 rainhas de abelhas *Apis mellifera* produzidas por transferencia simples. Apenas 36% das rainhas estudadas não apresentaram variações morfológicas nas glândulas ácidas que eram normalmente bifurcadas na região distal. As glândulas das demais rainhas apresentaram variações tais como: ramificações nas bifurcações, dilatações ao longo das glândulas, ausencia da bifurcação distal, duas ramificações desembocando independentemente dentro do reservatório e dutos comuns reduzidos (duas ramificações unidas próximo ao reservatório).

- NOGUEIRA NETTO, P. La tendencia de la agresividad de las abejas africanizadas en Brasil. *Bee World* 45(3):119-121. 1964. (316)

- \* NOTES ON African bees. *American Bee Journal* 112(8):303. 1972. (317)

- NTENGA, G. La abeja melifera de Tanzania (*Apis mellifera adansonii*). *Apiacta* no. 1:25-29. 1969. (318)

- \* NUNAMAKER, R.A. Newspaper accounts of Africanized bees are designed to frighten people being stung by the press. *American Bee Journal* 119(9):646-647, 657. 1979. (319)

Certainly the African/Africanized honey bee has been aggressive in South America (McGregor, 1970) and some people have died as a result of their stings (Kerr, 1967). However, my examination of newspaper reports indicate that at least some of the information released to the public has been inaccurate and highly exaggerated.



In each of the cited cases in which the reporter builds his case against Africanized bees, he used hearsay. In not one instance were the insects identified by an apiculturist or professionally trained person, a key issue because Africanized and European stocks are hard to tell apart, especially when they have similar or identical body coloration. In fact, in the early 1970's, the USDA gave a grant of approximately \$20,000 to Dr. Howell Daley, professor of entomology, University of California at Berkeley, to develop a system by which morphometric measurements can be used to distinguish between African and European stocks. Since differences can be slight, the data were computerized, and the measurements from each bee specimen were categorized by the computer. In other words, identification is not easy. However, in South America, according to newspaper reporters, the police, firemen and governmental officials have been making these difficult identifications, which leads one to question either the difficulty of identification or the reliability of the information being promulgated. I think that any time a person is stung in South America nowadays the insect is called an African or killer bee. This thesis is supported by Dr. W.E. Kerr (1967) who noted that "... every sting by wasps, which are very common in Brazil, is now attributed to African bees".

NUNAMAKER, R.A. African bees in Mexico. s.l., Cornell Referral Slip, 1980. 12 p. (320)

\_\_\_\_\_. Subspecies determination in the honey bee (*Apis mellifera* L.) based on isoelectric focusing of malate dehydrogenase. Ph.D. Thesis. Laramie, Wyo., University of Wyoming, 1980. 66 p. (321)

Isoelectric focusing on thin-layer polyacrylamide gels was used to study the electrophoretic banding patterns of the blood of honeybees from several countries. Well defined bands were obtained with 28 enzyme staining systems; only one enzyme malate dehydrogenase (MDH), was polymorphic. About 11,500 bees from 83 geographical locations were analysed for MDH activity. Based on the allele frequencies at this locus, it is possible to distinguish between tropical African or Africanized bees (homozygous for the allele with the greatest mobility) and European bees (which exhibit this allele in the heterozygous states and in low frequencies). The allele frequencies of the MDH band with intermediate mobility are useful for detecting bees of northern European ancestry. The honeybee population of N. America exhibited considerably more heterozygosity and heterogeneity than did populations of European countries. (Apicultural Abstracts 33(4): 1253. 1982).

\_\_\_\_\_. y WILSON, W.T. Comparison of MDH allozyme patterns in the African honey bee (*Apis mellifera adansonii* L.) and the Africanized populations of Brazil. Journal of the Kansas Entomological Society 54(4):704-710. 1981. (322)

Five hundred and fifty-two specimens of so-called Africanized honey bees from two areas of Brazil were analyzed for malate dehydrogenase (MDH) activity. Over 90% of these bees had MDH allozymes identical to those from 460 specimens collected from two sites in South Africa. This evidence indicates that the MDH gene pool of honey bees in Brazil has shifted strongly toward the African genotype. (Entomology Abstracts 13(9):7062. 1982).

NÚÑEZ, J.A. Quantitative investigation of behaviour of *Apis mellifera ligustica* Spinola and *Apis mellifera adansonii* Latreille: conditioning food and informational factors, and foraging activity. *Apiacta* 8(4):151-154. 1973. (323)

\* \_\_\_\_\_ . Estudio cuantitativo del comportamiento de *Apis mellifera ligustica* Spinola, y *Apis mellifera adansonii* Latreille: factores energéticos e informacionales condicionantes y estrategia del trabajo recolector. *Ciencia e Cultura (Brasil)* 26(8):786-790. 1974. (324)

Este estudio trata de comparar cuantitativamente el comportamiento recolector de la *Apis mellifera ligustica* Spinola y *A. mellifera adansonii* Latreille. Se llegó a la conclusión de que existen diferencias de adaptación de supervivencia en relación con el clima entre la abeja africana y la europea (*ligustica* y *mellifera*).

\_\_\_\_\_. Comparative study of thermoregulation between European and Africanized *Apis mellifera* in Brazil. *Journal of Apicultural Research* 18(2):116-121. 1979. (325)

The temperatures between brood combs was measured in free-flying colonies kept in 4-frames hives, under normal conditions and after heating with three 15-W light bulbs, and in small plastic hives kept in a cage inside a refrigerator at 10°C. Both European and Africanized honey bees were successful in maintaining a steady temperature in the brood nest under the various conditions. Some possible differences in the thermoregulatory mechanisms involved are discussed. (*Apicultural Abstracts* 31(1):198. 1980).

\_\_\_\_\_. Times spent on various components of foraging activity: comparison between European and Africanized honeybees in Brazil. *Journal of Apicultural Research* 18(2):110-115. 1979. (326)

Foraging behaviour patterns of two races of *Apis mellifera* were compared: E, of European origin, and A, hybrids descended from African strains. Results showed the following differences: (a) the time interval between inspecting two successive feeders was shorter for A than for E, if searching activity is excluded; (b) the relative endurance (faithfulness) at a patch (group) of feeders of A was about 60% of that of E; (c) when the rate of sugar flow was high, incomplete inspections of feeders were relatively more frequent by A than by E. These differences seem to be related to a higher sensitivity of A than of E to flow changes. Such a difference might help to explain the greater efficiency of A than E as a sugar (nectar) collector. (*Apicultural Abstracts* 31(1):180. 1980).

\* OIRSA prevé ataque de la abeja africana a personas. *La Nación*, San José; Oct. 14, 1983:6A. (327)

Se alertó sobre la peligrosidad de la abeja africana y sobre las consecuencias de su introducción. Se ofrece el ejemplo de Venezuela y Colombia donde la producción de miel bajó significativamente.

OKSMAN, M. Algunas reflexiones sobre el problema de la abeja "africana". *Gaceta del Colmenar (Argentina)* 32(360):98-106. 1970. (328)

- OKSMAN, M. La mansedumbre de las abejas ahumadas. La agresividad de las abejas. Gaceta del Colmenar (Argentina) 34(385):130-133. 1972. (329)
- \* ORDÓÑEZ M., C.E. y TORRES SANDOVAL, E. Comportamiento agresivo y mejoramiento genético de la abeja africanizada. In Seminario Técnico sobre Abeja Africanizada, 1º, Bogotá, Colombia, 1979. Memorias. IICA. Informes de Conferencias, Cursos y Reuniones, no. 190. 1979. pp. 41-66. (330)

Se informa sobre el Curso sobre Inseminación Instrumental, Biología y Genética de abejas realizado en Sao Paulo, Brasil en 1979. En anexos presenta el resultado de las labores, prácticas y manejo de la abeja realizadas.

- ORGANISMO INTERNACIONAL REGIONAL DE SANIDAD AGROPECUARIA. Observaciones recientes de las abejas africanizadas en Sur y Centro América. San Salvador, 1979. 12 p. (331)
- OSORIO, J.A. Presencia de la abeja africana en Venezuela y sus implicaciones. Caracas, Ministerio de Agricultura y Cría, Dirección de Sanidad Vegetal, 1976. 5 p. (332)
- \* También en: Revista de la Facultad de Agronomía (Maracay, Venezuela). Alcance no. 26:129-133. 1978.

La aparición en Venezuela de la abeja afro-brasileña es motivo de preocupación para la apicultura nacional, debido al conocimiento de los caracteres indeseables que tiene esta subespecie. La abeja africana o brasileira *Apis mellifera adansonii* viene desplazándose desde Brasil y ha cruzado la frontera venezolana por Santa Elena de Uairen a principio de este año 1976. El MAC debe darle un gran impulso a la apicultura mediante el desarrollo de un programa que abarque entre otros aspectos: investigación entomológica, legislación, extensión agrícola y zonificación.

- \* OTIS, G.W. The swarming behavior of the Africanized honeybee. Journal of the Agricultural Society of Trinidad and Tobago 77(4):313-317, 319-326. 1977. (333)

The swarming behaviour of Africanized *Apis mellifera* (Hym., Apidae) is described and methods of preventing swarming and absconding are discussed. The African bee tends to swarm far more frequently than European bees, and will tend to swarm before the hive cavity has been filled. After the prime swarm, afterswarms are often sent out so the colony becomes depleted. The distance covered by a swarm is often far greater than the European bees, accounting for the speed of their spread. Methods of control are discussed, but it is considered that use of these could place European bees at risk. (Animal Behaviour Abstracts 7(4):4717. 1979).

- \_\_\_\_\_, TAYLOR, O.R. y WINSTON, M.L. The ecological significance of engorgement of workers in swarms of Africanized honeybees. Journal of the Kansas Entomological Society 51(3):515. 1978. (334)

- \_\_\_\_\_. The swarming biology and population dynamics of the Africanized honey bee. Ph.D. Thesis. Lawrence, Ks., University of Kansas, Dept. Systematics & Ecology, 1980. 197 p. (335)

Colonies of feral Africanized honeybees were studied in Kourou, French Guiana; most were maintained in 6-comb top-bar plywood

hives. The initiation of drone rearing was the first indication that a colony was preparing to swarm; colonies began to construct queen cell cups soon afterwards. Of 98 colonies that built queen cell cups, 94 swarmed within 35 days. Of the 48 prime swarms observed, 38 issued within 2 days after the sealing of the first queen cell that ultimately survived; the rest did so within 6 days. Queen cells were sealed over a period of 6-11 days at a mean rate of 0.93 per day. Some colonies (14 of 42) destroyed a few (mean 6.4%) sealed queen cells before they allowed a queen to emerge. A few colonies delayed swarming till the first queen emerged, then the swarm emerged with the virgin queen; the old queen was killed or left behind. Only 5 of the 39 colonies for which the number of swarms was accurately determined failed to produce afterswarms. The net reproductive rate (number of colonies arising from one) per swarming cycle was 3.61. Heavy prime swarms appeared to be less likely than light ones to be followed by afterswarms.

Most swarms emerged before 10.00 h. The mean distances from the parent colony at which they clustered were: height, 4.7 m; horizontal distance, 6.5 m; direct distance, 9.6 m. The final distances moved by swarms is not known, as none of the 120 swarms that issued entered the empty hives that had been placed for that purpose. "Foreign" swarms entered 22 empty hives, and observations on these are given. Swarms were not aggressive unless frequently disturbed. Newly established colonies were not aggressive until after the emergence of new adult workers. Aggressiveness increased until colony growth caused overcrowding, then docility was restored when queen rearing began. Colonies were very aggressive after the first swarm issued, until one queen only was left.

Some new queens were confined in their cells by workers; of 183 confined queens, 151 were held for more than 1 day, 31 for more than 4 days and 1 for more than 10 days. Queens could emerge and co-exist for up to 24 h, and then leave with different swarms. Queen piping was associated with queen confinement and afterswarming. The mean time queens took from being ready to emerge to starting to lay was 9.71 (range 5-20) days.

Colony generation times were shortest at the time of year when most afterswarms were produced. Drones were destroyed in March and early April. Few queen cells were destroyed during the dry season (August-November). In April there was little reproductive swarming but much absconding. Swarming was most frequent at the times of year when colonies grew fastest. The only European honeybee colony available for comparison in the same environment had significantly fewer afterswarms in relation to its number of queen cells than the Africanized colonies had.

A computer simulation model of Africanized honeybee population dynamics, derived from the field data, suggests that an annual increase of 15 colonies from 1 is possible.

\* OTIS, G.W. y WINSTON, M.L. Africanized bee update. American Bee Journal 121(2):89. 1981.

- \* OTIS, G.W. et al. Engorgement and dispersal of Africanized honeybee swarms. *Journal of Apicultural Research* 20(1):3-12. 1981. (337)

The contribution of pre-swarmling engorgement by workers to the energetics of long-distance dispersal by swarms of Africanized honeybees was examined, by measuring the volumes and concentrations of nectar from honey sacs of bees from different types of swarms. The extent of worker engorgement varied with the type of swarm; in order of decreasing volumes of honey sac contents, these were: (1) absconding swarms, (2) prime swarms, (3) afterswarms, (4) in-transit swarms, (5) colonizing swarms. Relative to body weight, Africanized honeybees carried greater weights of nectar than have been reported for European honeybees. Calculations based on our measurements of engorgement, and estimates of metabolic rates, indicate that the maximum flight range for reproductive and absconding swarms was 64 km and 131 km, respectively. Colonizing reproductive swarms were moderately engorged, which suggests that these swarms had moved relatively short distances.

These observations are insufficient to account for the observed rate of population expansion of Africanized honeybees. The possibility that workers forage from swarms is discussed; such foraging could greatly extend the in-transit period and the distance moved by swarms. Engorgement is discussed as a factor influencing the fitness of swarms.

- \* OUTBREAKS AND new records: presence of African bee confirmed. *FAO Plant Protection Bulletin* 24(4):133-137. 1976. (338)

The presence of *Apis mellifera adansonii* Latr. in different regions of southern Venezuela was officially confirmed in September 1976.

THE OUTSTANDING commissions inform us "In Argentina, law for control of African bee and its hybrids". *Apiacta* 10(2):91. 1975. (339)

OWEN, M.D. The venom system and venom hyaluronidase of the African honeybee (*Apis mellifera adansonii*). *Toxicon* 21(1):171-174. 1983. (340)

A comparison between the venom system of examples of African honeybees (*Apis mellifera adansonii* (Latr.) from hives in Kenya and that of Italian honey bees (*A. mellifera ligustica* Spin.) showed that the former had smaller venom glands and less venom hyaluronidase than the latter. Changes paralleling those in Italian bees were noted in the venom reservoir volume and hyaluronidase content of African bees of different ages. (*Review of Applied Entomology*, B 71(12):3459. 1983).

- \* PACKER, J.S. La gran invasión de abejas. *Surco Latinoamericano (México)* 78(5):18-19. 1973. (341)

También en: *Agricultura Salvadoreña* 2(20):31. 1974.

Se describe cómo la abeja africanizada se ha dispersado en América del Sur desde 1956. De acuerdo al autor existe teóricamente solamente la barrera genética capaz de docilizar esta abeja, siendo necesario finalmente aprender a convivir con ellas.

- \* PAGE JUNIOR, R.E., ERICKSON JUNIOR, E.H. y LAIDLAW JUNIOR, H.H. A closed population breeding program for honey bees. *American Bee Journal* 122(5):350-351, 354-355. 1982. (342)

PAGER, H. The earliest European depiction of African bees (1602). *Bee World* 57(3):113. 1976. (343)

- \* PARENT, G., MALAISSE, F. y VERSTRAETEEN, C. Honey in the clear forest of Southern Shaba. *Bulletin des Recherches Agronomiques de Gembloux* 13(2):161-176. 1978. (344)

Having recalled the ancient importance of honey and wax in the Zambezian region, the authors bring a survey of the melliferous insects of the clear forest of Southern Shaba and record the main flower species they visit. The habitat of seven species of wild bees is precised. How honey is utilized is detailed. The period of honey harvest is determined and compared with those of the bordering areas. The estimation of the volumes yielded annually at the level of a village is made using two criteria: declared yields and hydromel consumption. The mean annual consumption for an adult living in clear forest is estimated at 15 liters. Physical and chemical characteristics of six honeys are given and compared with those of other African honeys. In addition to *Apis mellifica adansonii* Latr. already domesticated in other places, the authors suggest *Meliponula bocandei* Spin. for the improvement of local apiculture.

- \* PARRA, J.R.P. et al. Determinação de temperatura e umidade relativa no interior de colônias de insetos sociais para estudos bioecológicos. *Anais da Sociedade Entomológica do Brasil* 3(1):20-33. 1974. (345)

Com o objetivo de se determinar a temperatura e umidade relativa no interior de colônias de insetos sociais, desenvolveu-se o presente estudo no Departamento de Entomologia da ESALQ, em setembro de 1974. Para esas determinações foram utilizados pares termoeletricos acoplados a um potenciômetro Honeywell. Trabalhou-se com as seguintes espécies: *Cornitermes cumulans* (Kollan), *Acromyrmex coronatus* (F.), híbridos de *Apis mellifera adansonii* Latr. e *A.m. ligustica* Spin, e *Atta sexdens rubropilosa* Forel.

Através de observações realizadas no período diurno e noturno, obtiveram-se as temperaturas médias de 31,25°C para a abelha, 25,64°C para quem quem e 20,2°C para as outras duas espécies sendo que as umidades relativas médias no interior de todas as colônias foram superiores a 96%.

Nas diferentes estratificações destas colônias observaram-se diferenças ambientais. Houve correlação entre os fatores meteorológicos externos e os fatores temperatura e umidade relativa obtidos no interior das colonias, exceto para *C. cumulans* em que as variações de temperatura externa não exerceram efeito nas variações internas.

- PATERSON, P.D. The present economic status of *Apis mellifera adansonii*: summary and bibliography. *Bee World* 47(4):123-131. 1966. (346)

- \* PELED, R. Beekeeping in West Africa. *American Bee Journal* 111(6):222-223. 1971. (347)

- \* PESSOTTI, I. y LE'SENECHAL, A.M. Aprendizagem em abelhas. I. Discriminação simples em onze especies. Acta Amazônica (Brasil) 11(3):653-658. 1981. (348)

The ability of learning a simple discrimination between two colors yellow and blue, was measured in eleven species of social bees and marks were attributed to each species on the basis of the mean numbers of correct choices, number of correct choices after the last error, and number of responses during extinction. Several criterions for attributing such marks are presented. The training procedure included: shaping of the response of "landing" on the apparatus, differential reinforcement associated with yellow, for five bees, or blue for five other bees of each species, and extinction by removal of food. Each bee was trained individually through 70 choices between two small colored dishes and then submitted to extinction until 30 minutes pause was made. (Animal Behaviour Abstracts 10(3):2960. 1982).

- \_\_\_\_\_. y GOMES, M.J.C. Aprendizagem em abelhas. III. Discriminação com tres tipos de estímulos visuais. Revista Brasileira de Biología 41(3):667-672. 1981. (349)

Three species of social bees were trained to discriminate between two colours, or two forms or two light intensities. Twenty-eight *Apis mellifera adansonii*, 30 *Melipona rufiventris* and 30 *Melipona quadrifasciata anthidioides* were used as subjects. Each species was divided into six equivalent groups, according to the stimulus associated to food delivery: blue/yellow square/star and light-on/light-off. Results suggest that in discrimination tests: (1) use of colours favors *rufiventris* in detriment of the other two species, mainly *adansonii*; (2) use of light intensities favors *anthidioides* in detriment of *rufiventris*; and (3) use of geometrical forms gives a small advantage for *adansonii* over the two other species. (Entomology Abstracts 13(7):5123. 1982).

- PORTEOUS, H. Killer bees - are they headed this way? Californian Farmer (Cent ed) 243(8): 7, 38. 1975. (350)

- \* PORTUGAL ARAUJO, V. DE. Notas bionômicas sobre *Apis mellifera adansonii* Latr. Dusenía 7(2):91-102. 1956. (351)

El autor ofrece observaciones bionômicas de *Apis* en Africa y trata en este artículo los siguientes aspectos: colocación de colmenas en lo alto de los árboles por los indígenas africanos; método de recolección de miel; agresividad de las abejas; principios a observar en los apiarios africanos; observaciones sobre pigmentación del insecto realizadas en Quicabo, Dande, Ancola en el norte de Angola; en colmenas; otras observaciones tales como, resistencia al clima, contra enemigos, conducta de la abeja, producción, etc.

- PRANCE, G.T. Displacement of wasp pollinators by Africanized honey bees has been inferred. Biotropica 8:235. 1976. (352)

- \* PRESADA, W.A. The rebirth of Brazil's bee industry. American Bee Journal 121(9):630. 1981. (353)

The economic status of Brazil's apiculture industry is detailed. (Entomology Abstracts 13(6):4540. 1982).

- \* PRODUCEN ABEJAS reinas para sacar híbridos africanizados. La Nación, San José; Junio 26, 1983:17A. (354)

El Colegio Universitario de Puntarenas, Costa Rica, inició la producción de reinas con el fin de neutralizar la acción de la abeja africanizada. Se recomienda cambiar la reina todos los años para asegurar una mayor producción de miel y evitar la africanización total, trabajando con un híbrido que tenga cierto grado de esa influencia.

- \* PROPONEN AQUI cruce de abejas asesinas. La Nación, San José; Dic. 3, 1981:2A. (355)

Ante la llegada de la abeja africana a Costa Rica, el Dr. Darío Espina Pérez, especialista en apicultura elaboró un proyecto que entregó al Ministerio de Agricultura, en el cual propone trabajar en la procreación de reinas de alta productividad para cruzamiento y obtener un híbrido menos peligroso y con mayor producción de miel. El proyecto además contempla la necesidad de capacitar al apicultor costarricense y proveerlo de implementos necesarios para su manejo. Concluye con historia de la expansión de esta abeja a través del territorio americano.

- \* PROPUESTA PARA un programa nacional de prevención y control de la abeja africanizada. In Seminario Técnico sobre la Abeja Africanizada, 1°, Bogotá, Colombia, 1979. Memorias. IICA. Informes de Conferencias, Cursos y Reuniones, no. 190. 1979. pp. 6-17. (356)

Se propone un Programa Nacional de Prevención y Control de la Abeja Africanizada como complemento al Programa formulado por el Ministerio de Agricultura de Colombia el 21 de febrero de 1979. La ejecución del programa estará a cargo del Ministerio de Agricultura con la colaboración de otras instituciones y personal vinculado a este sector, con una duración de dos años y un presupuesto de C\$8.855.00 con una partida adicional de 50 millones de pesos para el otorgamiento de créditos a apicultores tradicionales y no tradicionales.

- \* RAMIREZ B., W. Qué hacer cuando llegue la abeja asesina. La Nación, San José; Oct. 10, 1979:6C. (357)

Se presentan recomendaciones sobre medidas de protección del público ante la presencia de la abeja africana así como métodos de prevención y curativos en caso de picaduras.

- \* RAZAS DE Africa y Asia Menor. In Espina Pérez, D. y Ordext, G.S. Apicultura tropical. 2a. ed. Cartago, Costa Rica, Editorial Tecnológica de Costa Rica, 1981. pp. 67-68. (358)

Incluye *A. mellifera adansonii*, señalando las características y resultados negativos que ha producido en la apicultura brasileña.

- \* RECOMENDACIONES SOBRE la abeja africanizada. La Nación, San José; Nov. 17, 1982:1C. (359)

El Dr. Gard W. Otis de la Universidad de Guelph de Canadá pronosticó la llegada de la "abeja asesina" a Costa Rica entre marzo y octubre de 1983. Recomendó el uso de vestimenta apropiada para su manejo. Resumió algunas recomendaciones e informó sobre asesoría que brinda el Ministerio de Agricultura para el desarrollo del Programa Apícola Nacional.



- \* RECOMENDACIONES TECNICAS regionales. 1a. Reunión de participantes al Curso de Genética e Biología de A.A. Brasil, 1983. Ribeirão Preto, Brasil, Universidade de São Paulo, 1983. 2 p. (360)

- \* UN RECURSO sencillo y práctico para solucionar el ingreso de abejas de origen africano en colmenares de las zonas costeras e islas del Paraná y todo el país. Boletín Rural INTA (Argentina) 8(91):9. 1974. (361)

Se describe el método a seguir para el manejo de las colmenas ante el ingreso de enjambres de abejas africanizadas a Argentina.

- \* RENSBERGER, B. Invasion by aggressive honeybees is feared. American Bee Journal 112(5):188. 1972. (362)

- \* RINCON RINCON, H. La abeja africanizada: monstruo fatal o recurso genético? ICA Informa (Colombia) 13(2):18-24. 1979. (363)

Se presenta antecedentes de la abeja africanizada en América y se indica que es menos feroz de lo que se dice y un manejo adecuado permite explotar sus características positivas. Ofrece bases para un plan a largo plazo en Colombia y precauciones que se deben tomar para trabajar con este insecto.

- \* RINDERER, T.E. y SYLVESTER, H.A. Identification of Africanized bees. American Bee Journal 121(7):512-516. 1981. (364)

The expanding population of undesirable Africanized bees (*Apis mellifera* L.) in South America has made clear the need for an objective method of identifying them. Daly's technique of morphometric analysis uses measurements of 25 physical characters of bees. At present it is somewhat slow and expensive, but a new procedure should reduce both time and cost. Allozyme analysis is faster and cheaper and is more directly related to the genetics of the bees. However, at present, it is limited to the enzyme malate dehydrogenase and so is much less accurate than is theoretically possible. The addition of other enzymes will increase its accuracy to equal and possibly exceed that of morphometric analysis. The accuracy of both techniques is further limited in Central America at present because of lack of baseline information. Because of the present limitations of allozyme analysis, we believe the report of Africanized bees in Mexico and Guatemala is very questionable.

- \* \_\_\_\_\_ . et al. Size of nest cavities selected by swarms of Africanized honey-bees in Venezuela. Journal of Apicultural Research 20(3):160-164. 1981. (365)

Most feral swarms of Africanized honeybees (*Apis mellifera*, South American ecotype) in Venezuela selected cavities with a volume of 80 litres as nest sites when presented with a choice of 10, 20, 40 and 80 litres. Agonistic behaviour between scout bees inspecting nest boxes was common, indicating that nest cavities were a limited resource for this population of feral honeybees.

- \* \_\_\_\_\_ . et al. Hoarding behavior of European and Africanized honey bees (Hymenoptera: Apidae). Journal of Economic Entomology 75(4):714-715. 1982. (366)

European *Apis mellifera* L. in laboratory cages hoarded significantly more sucrose solution than Africanized honey bees. Bees from both populations increased hoarding in the presence of 2-heptanone.

RINDERER, T.E., TUCKER, K.W. y COLLINS, A.M. Nest cavity selection by swarms of European and Africanized honeybees. *Journal of Apicultural Research* 21(2):98-103. 1982. (367)

The overall pattern of nest-box occupations by European bees in Louisiana indicated a minimum acceptable volume of c. 10 litres, a maximum acceptable volume of c. 40 litres, and no preference between these extremes. Africanized bees in Venezuela had a nest-box occupation pattern indicating a minimum acceptable volume of c. 20 litres, no maximum acceptable volume within the limits of the sizes available in the experiment, and no clear preference between volumes from 20 to 120 litres. These data suggest a model of nest-cavity selection formulated as a hierarchical set of choices.

Africanized swarms weighed more, although the individual bees in them weighed less, and they always built a smaller total area of comb and tended to include fewer drones, than swarms of European bees. (*Apicultural Abstracts* 34(2):525. 1983).

ROBERTS, E. A survey of beekeeping in Uganda. *Bee World* 52(2):57-67. 1971. (368)

\* ROBINSON, F.A. Africanized bees: a problem that won't go away! *American Bee Journal* 121(9):625-626. 1981. (369)

In 1981, there was unanimous agreement among the scientists, the administrators and the industry representatives that the Africanized bees in South America do present a real threat to managed bee-keeping in Mexico and the United States and that a continued and expanded research program should be carried on by the USDA. (*Entomology Abstracts* 13(6):4636. 1982).

ROCCARAINOLA, P.G.P. Ferocious bees. *Apic. Mod.* 63(12):235-236. 1972. (370)

RODRIGUEZ, R.G. Presencia de la abeja africanizada en Venezuela. Comentarios en relación a su impacto sobre la apicultura y salud pública. Venezuela. Ministerio de Agricultura y Cría. Boletín Técnico no. 5. 1979. 26 p. (371)

ROFF, C. Aspects of genetics of honeybees. *Australas Beekeep.* 78(6):132-134. 1976. (372)

ROTERMUND, H.W. Controle das abelhas africanas. *Gleba (Brasil)* 14(163):19-21. 1968. (373)

\_\_\_\_\_. Problemas de apicultura no Brasil. O estudo das abelhas africanas. In *Congresso Latinoamericano de Apicultura, 1º*, La Plata, Argentina, 1968. s.n.t. (374)

\* ROTHENBUHLER, W.C. Further analysis of Committee's data on Brazilian bee (*Apis mellifera adansonii*). *American Bee Journal* 114(4):128. 1974. (375)

Aggressiveness of Brazilian bees in southern Brazil was measured by shaking a piece of black suede in front of the hive. The operator then walked away carrying the suede and the distance the bees followed and the number of stings in the suede were recorded. The number of stings (1-92) was significantly correlated with distance followed (1-1044 m), but there was no link with colony strength, measured by number of combs covered by bees.

A wild colony, which was probably near to an African genotype, behaved more aggressively at 27 or 28°C than at 24°, but two selected "gentle" strains behaved very similarly at all three temperatures. (Apicultural Abstracts 26(3):132. 1975).

- \* ROUBIK, D.W. Competitive interactions between neotropical pollinators and Africanized honey bees. *Science* 201(4360):1030-1032. 1978. (376)

The Africanized honey bee, a hybrid of European and African honey bees, is thought to displace native pollinators. After experimental introduction of Africanized honey bee hives near flowers, stingless bees became less abundant or harvested less resource as visitation by Africanized honey bees increased. Shifts in resource use caused by colonizing Africanized honey bees may lead to population decline of Neotropical pollinators.

\_\_\_\_\_. Africanized honeybees, stingless bees, and the structure of tropical plant-pollinator communities. In International Symposium on Pollination, 4th, Maryland, Fla., 1979. Proceedings. Ed. by D. Caron. College Park, Maryland, University of Maryland, 1979. pp. 403-417. (Miscellaneous publication no. 1). (377)

Bee-plant associations were observed in tropical forest near Kourou, French Guiana shortly after the arrival of the Africanized honeybee. These data and similar ones from Belém, Brazil (published in 1901-1906), are presented in order of plant family, with the associated bee genera for each. The analysis involved 239 bee and 119 plant species at Belém, and 210 bee and 198 plant species at Kourou. Taxonomically related bees were similar in floral preference, and were treated as "forager guilds".

Trigonini were the most generalized flower visitors, and then Africanized honeybees. These bees were regarded as "pivotal" to bee community structure, due to their degree of resource overlap with several other guilds.

Highly social bees (*Apis*, *Melipona*, *Trigona*) are believed to have pollinated 84-100% of the species they visited. *Melipona* and *Apis* seem capable of intercanopy movement in undisturbed forest. (Apicultural Abstracts 31(2):700. 1980).

\_\_\_\_\_. Competition studies of colonizing Africanized honeybees and native pollinators in South America. Thesis. Lawrence, Kansas, University of Kansas, 1979. s.p. (378)

- \* \_\_\_\_\_ Foraging behavior of competing Africanized honeybees and stingless bees. *Ecology* 61(4):836-845. 1980. (379)

The colonizing success and potential influence of immigrant Africanized honeybees in the neotropics depends on their foraging style and competitive ability. Experiments were performed to compare the foraging tactics of this invading species to those of its most abundant competitors, highly social stingless bees of the genera *Melipona* and *Trigona*. In an area containing a rich assemblage of stingless bees in French Guiana, Africanized honeybees were significantly more abundant on honey-water feeders during a high "nectar flow" period than combined stingless bee and wasp species. During the last 15 min. of the experiments, when bait was not replenished on feeders, Africanized honeybees abandoned the feeders but native foragers continued to arrive.

None of the stingless bees, including four aggressive *Trigona*, displaced from the feeders the foragers of several (two of seven) colonies of Africanized honeybees. The cost of attacking Africanized honeybees at feeders apparently exceeded the benefit for large, aggressive *Trigona williana* and *T. hyalinata branneri*. These bees abandoned feeders visited by nonaggressive Africanized honeybees. Single, small Africanized honeybee colonies were displaced from feeders by aggressive foragers of *T. pallens pallens* and *T.h. branneri*. In one instance Africanized honeybees shifted almost immediately to a floral resource, while abandonment of the feeders by *T. williana* was not followed by a shift to a natural food source. Reduction of competitive interaction with Africanized honeybees was accomplished by foragers of *T. clavipes* and *T.p. pallens* that partitioned four feeders by visiting only two, leaving the others to Africanized bees. Interspecific displacement was never absolute; a few foragers from a displaced colony always visited the feeders.

Africanized honeybees and *Melipona fulva* foraged nonaggressively both at feeders and flowers, but Africanized bees at feeders exhibited low levels of aggression toward *Melipona* and polybiine wasps on one occasion. Unlike other aggressive *Trigona*, *T. clavipes* was at times unaggressive.

Colonies of *T.h. branneri* and Africanized honeybees, the bees most successful in displacing other species from feeders, were comprised of many more workers than colonies of the other bees. The combined advantages of (1) the ability to communicate the distance and direction of a food source from the nest, (2) large forager size, and (3) large colony size provide Africanized honeybee colonies with a competitive ability superior to that of stingless bees at rich, compact resources.

ROUSSY, L. [Substances used against honeybee aggressiveness]. *Gazette Apicole* 77(823):123-124, 144. 1976. (380)

RUTTNER, F. La abeja *adansonii*. *Apiacta* 8(3):107-108. 1973. (381)

\_\_\_\_\_. African bee (*Apis mellifera adansonii*) in South America. *Biene* 111(11):324-327. 1975. (382)

\* SANTIS, L. DE y CORNEJO, L.G. La abeja africana (*Apis (Apis) adansonii*) en América del Sur. *Revista de la Facultad de Agronomía (La Plata, Argentina)* 44(1):17-35. 1968. (383)

En este trabajo los autores se ocupan de la invasión de América del Sur por los híbridos de la abeja africana *A. (A.) adansonii* Latreille, 1804, y de otras especies de *Apis* introducidas en su territorio.

En primer lugar la ubican taxionómicamente siguiendo el trabajo del especialista Tsing-Chao Maa (1953) e indican concretamente, los caracteres que permiten diferenciarla de *A. (A.) mellifera* Linné, 1758, y *A. (A.) remipes* Gerstaecker, 1862, que son las que tienen mayor difusión en América. Se ocupan después de la distribución que ha alcanzado hasta el presente y que abarca zonas más o menos extensas del Brasil, Paraguay, Bolivia y la República Argentina y agregan datos biológicos de interés con especial referencia a su agresividad y los accidentes que provoca, completando con observaciones sobre aprovechamiento. Finalmente, proponen las medidas que

deben adoptarse en el caso particular de la República Argentina, son éstas:

1. Vigilar por medio de los servicios destacados en la zona afectada, los movimientos del insecto tal como se está haciendo en el Brasil a fin de tener al día esa información.
2. Aplicar en su manejo las normas técnicas que la práctica de la apicultura racional aconseja, acordes con las exigencias y modalidades biológicas de la especie con que tendrá que trabajarse en lo sucesivo.
3. Fiscalizar los movimientos de material vivo desde el área invadida y otras que en cualquier momento pueden serlo, a las demás zonas apícolas del país, dictando para ese fin, las reglamentaciones que correspondan.
4. Realizar por intermedio de los organismos técnicos especializados, trabajos de selección y mejoramiento que conduzcan a la obtención de líneas de probada mansedumbre y adaptación a las prácticas apícolas consideradas como más racionales y, sobre esta base, recién entonces promover la cría de *A. (A.) adansonii* con fines utilitarios.

Los materiales estudiados, recolectados en los estados de Río Grande do Sul y Santa Catarina (Brasil), quedan incorporados a las colecciones del Museo de la Plata.

SANTIS, L. DE. La amenaza de las abejas africanas. Gaceta de la Tarde, La Plata, Argentina; Setiembre 15, 1968: Suplemento 8. (384)

\* \_\_\_\_\_ . Ubicación taxonómica de la abeja africana (*Apis mellifera adansonii*). Producción Animal (Argentina) 2(2):45-51. 1970. (385)

Se presenta la sistemática de las abejas melíferas que se incluyen en la tribu *Apini* o *Apidini*. El autor y L.G. Cornejo, siguiendo a T. Maa han clasificado a la forma *adansonii* como una especie diferente de *Apis mellifera*, y sólo puede ser considerada una subespecie de la misma. Le designaron el nombre de *Apis mellifera adansonii* Latreille, 1804.

\* \_\_\_\_\_, VIDAL SARMIENTO, J.A. y CORNEJO, L. Nota sobre un "Melipónido" indígena que combate con las abejas africanas (Insecta: Hymenoptera). Ciencia y Abejas (Argentina) 2(5): 27-30, 32-33, 35-36. 1972. (386)

En este trabajo los autores estudian la subespecie de melipónido indígena *Trigona (Tetragona) angustila fiebrigi* Schwartz, 1938, que es conocida en nuestro medio, con el nombre guaraní de "yatei". Ha sido observada en la provincia del Chaco, combatiendo con las molestias abejas africanas (*Apis mellifera adansonii* Latreille).

\_\_\_\_\_, VIDAL SARMIENTO, J.A. y CORNEJO, L.G. La identificación de *Apis mellifera adansonii*. Aprobado por el XXIV Congreso Internacional de Apicultura celebrado en Buenos Aires del 14 al 20 de octubre de 1973. s.l., 1973. s.p. (387)

- \* SANTIS, L. DE, VIDAL SARMIENTO, J.A. y CORNEJO, L.G. Abejas *adansonii* y nomenclatura zoológica. Ciencia y Abejas (Argentina) 2(6):49-52, 54. 1974. (388)

En este trabajo, los autores establecen que el nombre vulgar que corresponde usar para designar a *Apis mellifera adansonii* Latreille, 1804, es "abeja adansonii" y no "abeja brasileña" como ha propuesto la Comisión Norteamericana para el estudio de dicha abeja en América del Sur.

- \_\_\_\_\_. y CORNEJO, L.G. La identificación de las abejas africanizadas en América del Sur. Gaceta del Colmenar (Argentina) 41(2):56-58, 60-61. 1979. (389)

In 1976 Ruttner concluded that the subspecies introduced into Brazil was *Apis mellifera scutellata*, not *A.m. adansonii*. Vidal Sarmiento et al proposed several characteristics for the best identification of Africanized bees. Their method is compared with those proposed by other authors. The taxonomy of other African races of *A. mellifera* is discussed. (Apicultural Abstracts 31(3):884. 1980).

- SCHELEY, G. Apicultores sureños y norteños enfrentando el problema de las abejas africanas. Gaceta del Colmenar (Argentina) 32(368):326-327. 1970. (390)

- SCHNEIDER, D. Myth of the killer bees. Pest Control Technol. 4(11):16, 18-19. 1976. (391)

- \* SCHONHARDT, A.W.M. Combate a abelha africana. Lavoura (Brasil) 78:14-15. 1975. (392)

Depois de analisar as causas do declínio da produção brasileira de mel de abelhas, o autor estudou e experimentou a criação de abelhas mansas européias (Italianas) prevenindo a reinfestação das abelhas *Apis melífica adansonii* (Africana) utilizando as abelhas campeiras desses enxames agressivos para reforçar colmeias de abelhas européias a fim de provocar-lhes desenvolvimento mais rápido enquanto aniquila a africana, finalizando por eliminá-la empregando um sistema de troca das colméias de lugar.

- SCHWARZEL, E. √African bees in Brazil√. Nordwestdtisch Imkerztg 25(5):144-147. 1973. (393)

- SCHWEISHEIMER, W. Aggressive honey bees displacing normal bees; recent results with a dangerous bee species in Brazil. Schweiz Bienen-Zeitung 96(2):65-67. 1973. (394)

- \_\_\_\_\_. √The dangerous Brazilian honeybees show signs of becoming gentler√ (En alemán). Neue Bienenzucht 3(4):128-130. 1976. (395)

- \_\_\_\_\_. √The dangerous *Apis mellifera adansonii* becomes milder√ (En alemán). Bienenwelt 19(7):165-166. 1977. (396)

- SEEGERS, S. y SEEGERS, K. The truth about those "killer bees". Reader's Digest 108(645): 25, 28, 31. 1976. (397)

- SEGUIMOS HABLANDO de "africanizadas". Gaceta del Colmenar (Argentina) 34(383):84-86. 1972. (398)

- \* SEMINARIO TECNICO SOBRE ABEJA AFRICANIZADA, 1º, BOGOTA, COLOMBIA, 1979. Memorias. IICA. Informes de Conferencias, Cursos y Reuniones, no. 190. 1979. 97 p. (399)

En este seminario se presentan trabajos sobre manejo, comportamiento, mejoramiento genético, producción, comercialización y control de la abeja africanizada. En anexos incluye informes sobre la presencia de la abeja en Colombia.

- SHABANOV, M. Biological equilibrium and African honey-bees. Pchelarstvo 74(10):13-16. 1976. (400)

- \* SHIPMAN, W.H. Separation of the components of Brazilian bee venom - a preliminary report. American Bee Journal 115(2):56, 59. 1975. (401)

- \_\_\_\_\_. y VICK, J.A. Studies of Brazilian bee venom. Cutis 19(6):802-804. 1977. (402)

The results are presented of analyses of the venoms of the Italian bee, *Apis mellifera ligustica* Spin. and of an African bee introduced into Brazil, *A. mellifera adansonii* Latr., together with determinations of the LD50 of whole venom and 5 fractions and of the neuromuscular blocking effect of these fractions. The data showed that there are significant differences between the 2 venoms and suggest that they can be used as a means of identifying *A.m. adansonii*. (Review of Applied Entomology, B 66(11):2746. 1978).

- \* SILVA, R.M.B. DA. Densidade do mel das abelhas "Africanizadas". Boletim de Indústria Animal (Brasil) 24:219-222. 1967. (403)

Mediu-se a densidade de amostras de mel de abelhas africanizadas e comparou-se estas com semelhantes determinações sobre amostras de mel de abelhas de raças européias, obtidas no mesmo local (Estação Experimental de Produção Animal-Pindamonhangaba) objetivando conhecer a qualidade daquele, que se alega ser "aguado" ou "ralo". Adicionalmente, procurou-se verificar se estavam as amostras de mel de africanas, dentro dos requisitos de concentração considerados necessários a méis de qualidade comercial.

Os resultados mostraram, por um lado, que não há diferença na densidade dos méis produzidos pelas diversas raças de abelhas na E.E.P.A. e, por outro, que a densidade observada dos méis oriundos de colônias africanizadas ( $1,436 \pm 0,00006 \text{ gr/cm}^3$ ) está perfeitamente dentro do requerido para méis comerciais. Isto leva à conclusão de que a outras causas, que cumpre verificar, mas não a densidade, ou seja, ao teor em água, deve atribuir-se qualquer diferença porventura existente na qualidade dos méis em questão.

- \* \_\_\_\_\_. y SCOTT, W.N. Sobre a bionomia de *Apis* afroeuropéias do Brasil. Boletim de Indústria Animais (Brasil) 24:199-208. 1967. (404)

Foi dissecado certo número de colônias de abelhas (*Apis mellifera* L.) estabelecidas e desenvolvidas em estado servagem (isto é, colônias provenientes de enxames de origem desconhecida, sem dono, habitando abrigos "naturais", como ôcos de árvores, buracos e especialmente, termiteiros), encontradas em campos e matas do Estado de São Paulo, região de Pindamonhangaba. Delas se obteve certo número de dados biométricos e as correspondentes observações referentes às condições da colônia e seu comportamento. Na discussão dos resultados, foram

êles relacionados com observações, próprias e alheias, sobre abelhas semelhantes, criadas em colméias racionais, e sobre a subespécie africana *A. mellifera adansonii* Latr., tida como ascedente das primeiras citadas.

Com base nos resultados obtidos é dada uma descrição das colônias, que inclúe, espessura, vão, coloração (abdomen, *scutellum* e *pelagem*) e comportamento, o qual é qualificado de "variável e dificilmente previsível".

- SIGNORELLI, G. [The Carniolan queen used in the control of aggressive bee populations]. APE, Riv. Svizz. Apic. 59(4):59-60. 1976. (405)
- SILBERRAD, R. *Adansonii* in adversity. British Bee Journal 102(4325):160-161. 1974. (406)
- SMITH, D.W. y CRANE, R. Block that bee. Time, Sep. 18, 1972:81. (407)
- SMITH, F.G. The races of honeybees in Africa. Bee World 42(10):255-260. 1961. (408)
- \_\_\_\_\_. Races of honeybees: African races of *Apis mellifera*. In Apimondia Scientific Bul. Symposia, Bucharest, Romania, 1972. Ed. by V. Harnij. Bucharest, Romania, Apimondia Publishing House, 1972. pp. 363-366. (409)
- \_\_\_\_\_. African races of *Apis mellifera*. Apiacta 8(3):99-101. 1973. (410)
- \* SOARES, A.E.E. Chartreuse-limão: first eye mutation induced by gamma radiation with  $^{60}\text{Co}$  in the honeybee. Journal of Apicultural Research 20(3):137-139. 1981. (411)
- A mutation conferring yellow eye-colour on bees was induced by prolonged application of  $^{60}\text{Co}$  gamma radiation to small colonies of *Apis mellifera adansonii*. After segregation and allelism tests with other mutants, the new gene was shown to belong to the chartreuse series, and was named chartreuse-limão ( $ch^{11}$ ).
- SOCIEDAD COLOMBIANA DE ENTOMOLOGIA. Control de abejas agresivas. Sociedad Colombiana de Entomología. Boletín Divulgativo no. 1. 1979. 12 p. (412)
- \* SOLANO, H. Piden prohibir la traída de abejas. La Nación, San José; Jul. 11, 1982:2A. (413)
- Se sugiere prohibir la importación de reinas en Costa Rica que puedan cruzarse con la abeja africanizada para disminuir su agresividad, debido a la existencia en el país de razas extremadamente dóciles. Se menciona además que la importación puede significar la introducción de enfermedades y parásitos dañinos a las abejas nacionales.
- \* SOLUCION CONTRA abejas asesinas. La República, San José; Junio 6, 1979:5. (414)
- El Prof. Nelson Cuenca, especialista en Apicultura de la Escuela de Ciencias Ambientales de la Universidad Nacional en Costa Rica, sugiere colocar grupos locales de abejas muy mansas en la zona sur y de esta forma crear una barrera genética ante la llegada de la abeja africana. Señala su agresividad y da algunas recomendaciones sobre su manejo.



SOMMER, P.G. Observações em apiários no estado do Paraná, colhidas no período de 1942 a 1972. In Congresso Brasileiro de Apicultura, 2º, Sete Lagoas, Brasil, 1972. [Anais]. Curitiba, Brasil, Associação Mineira de Apicultura, 1972. pp. 130-132. (415)

The annual pattern of nectar flows is set out, and changes brought about the arrival of the African bee (*A. m. adansonii*) are reported; "Africanization" was complete by 1960. A beekeeper now tends to own more colonies (e.g. 800 instead of 150), but there are fewer in any one apiary (40). Honey production per colony has risen rapidly, the record to date being 180 kg; this is likely to drop as the ecological niche that was available to *A. m. adansonii* becomes full. (Apicultural Abstracts 26(1):50. 1975).

\_\_\_\_\_. Behavior of Africanized honeybees in Parana State during observations made in the 1960-1970 period. *Apic. Clim. Quente Api. Hot. Clim.* 1979:77-79. 1979. (416)

SONDEREGGER, E. [Invasion of African bees in South America] (En alemán). *Bienenvater* 94(12):345-347. 1973. (417)

\_\_\_\_\_. [Experiences with African bees in Argentina] (En alemán). *Bienenwelt* 18(7):151-153. 1976. (418)

\* SOUTH AFRICANS visit Dadant & Sons. *American Bee Journal* 114(12):452. 1974. (419)

\* SOUTH AMERICAN bees. *American Bee Journal* 115(8):301. 1975. (420)

\* STEARMAN, A.M. Working the "Africans" in eastern Bolivia. *American Bee Journal* 121(1):28, 30-35, 43-44. 1981. (421)

STEJSKAL, M. Abejas cárnica - versus - adansonii. *Apiacta* 8(3):127-128. 1973. (422)

\_\_\_\_\_. The menace of the Brazilian bee (*Apis mellifera adansonii*). *Bienenvater* 96(5):135-137. 1975. (423)

\_\_\_\_\_. La realidad sobre la abeja asesina. *Investiga* 1(2):1-5. 1975. (424)

\_\_\_\_\_. Control de abejas africanizadas en Venezuela. In Congreso Venezolano de Entomología, 4º, Maracay, Venezuela, 1979. Resúmenes. Maracay, Venezuela, Sociedad Venezolana de Entomología, 1979. p. 26. (425)

\_\_\_\_\_. Las abejas africanizadas escutellatas en Venezuela. In Congreso Venezolano de Zootecnia, Caracas, 1978. [Informe]. Caracas, Asociación Venezolana para el Avance de la Ciencia, 1978. p. 102. (426)

\* STONER, A. y WILSON, W.T. Selected references to the African/Brazilian honeybee. *Gleanings in Bee Culture* 104(9):328-330. 1976. (427)

Este artículo contiene referencias sobre los siguientes aspectos de interés a los apicultores: 1) lugares donde pueden obtenerse publicaciones periódicas científicas, revistas comerciales y copias de artículos; 2) revistas especializadas en apicultura; 3) nombres y direcciones de científicos; y 4) bibliografía selectiva sobre abeja africanizada.

- \* STONER, A. y WILSON, W.T. A review of the public's reaction to Africanized honeybees. *Gleanings in Bee Culture* 105(9):405-408. 1977. (428)

Los autores presentan una relación sobre las reacciones del público ante la abeja africanizada, cuya agresividad ha sido evidentemente exagerada.

- STORT, A.C. Estudo genético da agressividade de *Apis mellifera*. Thesis Dr. Araraquara, Brasil, Faculdade de Filosofia, Ciências e Letras de Araraquara, 1971. 166 p. (429)

\_\_\_\_\_. Relações entre caracteres do comportamento agressivo e caracteres morfológicos de abelhas do género *Apis*. In *Homenagem a Warwick E. Kerr*. s.l., s.e., 1972. pp. 275-283. (430)

- \_\_\_\_\_. Genetic study of the aggressiveness of two subspecies of *Apis mellifera* in Brazil. I. Some tests to measure aggressiveness. *Journal of Apicultural Research* 13(1):33-38. 1974. (431)

Five tests based on the use of small leather balls, kept in motion just outside the hive entrance, were used to evaluate the relative aggressiveness of Italian (*Apis mellifera ligustica*) and Africanized bees (*Apis mellifera adansonii*) in Brazil. The tests were: period before the first sting; period before becoming fierce; number of stings in the observer's gloves; number of stings in the leather ball; distance that the bees followed the observer. Data obtained from 5 colonies of Italian bees and 9 of Africanized bees showed that the latter were significantly more aggressive. (*Apicultural Abstracts* 26(3):133. 1975).

- \_\_\_\_\_. Genetic study of the aggressiveness of two subspecies of *Apis mellifera* in Brazil. II. Time at which the first sting reached a leather ball. *Journal of Apicultural Research* 14(3/4):171-175. 1975. (432)

The test used in this study was applied to colonies of Africanized *A. m. adansonii*, imported Italian *A. m. ligustica*, their F<sub>1</sub> hybrids and the progeny of F<sub>1</sub> drones backcrossed to Africanized and Italian queens. The data from F<sub>1</sub> colonies indicated dominance of the Africanized bees; other data emphasize the complexity of the method of inheritance of "aggressiveness". (*Animal Behaviour Abstracts* 4(3):3108. 1976).

- \_\_\_\_\_. Genetic study of the aggressiveness of two subspecies of *Apis mellifera* in Brazil. IV. Number of stings in the gloves of the observer. *Behavior Genetics* 5(3):269-274. 1975. (433)

In studies in Brazil, data were analysed on aggressiveness in workers from colonies of Africanised bees (*Apis mellifera adansonii* Latr.), Italian bees (*A. mellifera ligustica* Spin.), their F<sub>1</sub> hybrids, and backcrosses of the F<sub>1</sub> to the parental stocks. The segregation values (3:1) in the backcrosses to the Africanised stock and non-segregation in the backcrosses to the Italian stock suggest the existence of two pairs of genes (F<sub>1</sub>/F<sub>1</sub>; F<sub>2</sub>/F<sub>2</sub> in the Italian bees and f<sub>1</sub>/f<sub>1</sub>; f<sub>2</sub>/f<sub>2</sub> in the Africanised bees) that control a character defined as the number of stings in the gloves of the observer. (*Review of Applied Entomology*, B 64(10):2954. 1976).

STORT, A.C. Genetical study aggressiveness of two subspecies of *Apis mellifera* in Brazil. V. Number of stings in the leather ball. *Journal of Kansas Entomological Society* 48(3): 381-387. 1975. (434)

Data are presented suggesting the mode of inheritance of a 4th character involved in the aggressiveness of Africanized honey bees in Brazil. Colonies of Africanized bees (*Apis mellifera adansonii*), Italian bees (*A. m. ligustica*), their F<sub>1</sub> hybrids and backcrosses were tested by presenting a small black leather ball at the hive entrance for 60 sec. The number of stings in the leather ball was used as the measure of aggressiveness. The segregation values (3:1) in the backcrosses to the Africanized ancestors and the segregation values (1:1) in the backcrosses to the Italian ancestors suggest that this trait is controlled by 2 pairs of genes; A<sup>m</sup>/A<sup>m</sup>, B<sup>br</sup>/B<sup>br</sup> in the Italian and A<sup>br</sup>/A<sup>br</sup>, B<sup>m</sup>/B<sup>m</sup> in the Africanized bees. One test cross produced results which fit this hypothesis. (*Animal Behaviour Abstracts* 4(1): 1062. 1976).

\* \_\_\_\_\_ . Genetic study of the aggressiveness of two subspecies of *Apis mellifera* in Brazil. III. Time taken for the colony to become aggressive. *Ciência e Cultura (Brasil)* 28(10): 1182-1185. 1976. (435)

Estudo genético da agressividade de duas subespécies de *Apis mellifera* no Brasil. III. Tempo que leva para a colmeia tornar-se agressiva. O teste de agressividade usado nesse estudo foi aplicado a colônias de abelhas africanizadas, a abelhas italianas importadas (*Apis mellifera ligustica*), aos híbridos F<sub>1</sub> e às progênes dos zangões retrocruzados com rainhas italianas e africanizadas. Os dados das colônias F<sub>1</sub> indicaram dominância das abelhas africanizadas, e os dados obtidos das colônias dos retrocruzamentos sugeriram ação epistática em vez de efeito aditivo dos genes que controlam o caráter. Cruzamentos teste entre machos provenientes de uma colônia agressiva de retrocruzamento africano e rainhas italianas oriundas de uma linhagem de endrocruzamento, forneceram resultados que concordam com a dominância do tipo agressivo.

\_\_\_\_\_ . Genetic study of the aggressiveness of two subspecies of *Apis mellifera* in Brazil. VII. Correlation of the various aggressiveness characters among each other and with the genes for abdominal color. *Ciência e Cultura (Brasil)* 30(4):492-496. 1978. (436)

Earlier papers in this study gave results of various tests for measuring aggressiveness. Pearson's correlation coefficients have now been calculated to compare the relationships between 5 characters of aggressive behaviour. Differences were found between values for Italian and for Africanized backcrosses. Aggressive behaviour does not appear to be influenced by the Ac and ac genes which control the abdominal colour of F<sub>1</sub> drones. (*Apicultural Abstracts* 33(3):872. 1982).

\* \_\_\_\_\_ y CHAUD-NETTO, J. Study of the size of sting and comparison with the aggressive behavior in Africanized and Italian bees. *Ciência e Cultura (Brasil)* 30(3):332-335. 1978. (437)

Estudo do tamanho do ferrão e comparação com o comportamento agressivo de abelhas africanizadas e italianas. Os dados obtidos para comprimento do ferrão, nas colônias F<sub>1</sub> nas colmeias dos retrocruzamentos africanizados e italianos, sugerem herança poligênica para

este caráter. O tamanho dos ferrões de abelhas coletadas no interior da colmeia. O resultado mostrou que não há relação entre tamanho do ferrão e comportamento agressivo.

- \* STORT, A.C. y GONÇALVES, L.S. A abelha africanizada e a situação atual da apicultura no Brasil. *Ciência e Cultura (Brasil)* 31(1):32-43. 1979. (438)

Se suministra la siguiente información con relación al tema: motivo de la introducción de las abejas africanas al Brasil; alta capacidad de producción de miel; razones de su alta productividad; comportamiento agresivo; y enfoques sensacionalistas de la prensa.

- \_\_\_\_\_. y GONÇALVES, L.S. Africanized honeybee and the present situation of Apiculture in Brazil. *Apic. Clim. Quente Api. Hot. Clim.* 1979:155-172. 1979. (439)

- \_\_\_\_\_. Aggressive behavior and sensory structures in Africanized and Italian honeybees. *Apic. Clim. Quente Api. Hot. Clim.* 1979:53-55. 1979. (440)

- \_\_\_\_\_. Selection of morphological characters in 3 subspecies of *Apis mellifera*. *Apic. Clim. Quente Api. Hot. Clim.* 1979:129-130. 1979. (441)

Incluye *Apis mellifera adansonii*.

- \_\_\_\_\_. Comparative analyses of morphological characters in Italian, German and African bees, and in Africanized bees originating from their crossings. In *International Congress of Apiculture, 27th, Athens, 1979. Proceedings.* Bucharest, Romania, Apimondia Publishing House, 1980. pp. 310-314. (442)

A biometric study was made of Africanized bees collected in 6 regions of Brazil, and values were compared with characteristics of "pure" subspecies *A. m. mellifera*; *A. m. ligustica* and *A. m. adansonii*. The "degree of Africanization" was highest in bees from the 3 sites nearest Rio Claro (the site of introduction of *A. m. adansonii* in 1956). Bees from the 3 more distant areas were less Africanized. (*Apicultural Abstracts* 33(1):133. 1982).

- \* \_\_\_\_\_ y CHAUD-NETTO, J. Estruturas sensoriais e atividade de vôo em abelhas africanizadas (*Apis mellifera adansonii*). *Revista Brasileira de Biologia* 40(4):717-720. 1980. (443)

Este trabalho apresenta dados sobre o número de estruturas sensoriais olfativas (discos olfativos) e visuais (omatídeos) em zangões haplóides e diplóides selvagens (olhos negros), em zangões haplóides chartreuse-red ( $ch^r$  = olhos vermelhos) e sua provável implicação em relação à atividade de vôo destas abelhas. São também apresentados dados comparativos entre operárias diplóides e triplóides de olhos negros, com relação àqueles caracteres sensoriais.

- \_\_\_\_\_. Genetic study of the aggressiveness of two subspecies of *Apis mellifera* in Brazil. VI. Observer persecution behaviour. *Revista Brasileira de Genética* 3(3):285-294. 1980. (444)

Colonies of Africanized (*A. m. adansonii*) and Italian bees (*A. m. ligustica*: Hym., Apidae), of the  $F_1$  hybrids and colonies of Africanized and Italian backcrosses were studied for the trait distance

of observer persecution. The data obtained for the F<sub>1</sub> colonies suggest dominance of the Italian bees' gentle behaviour (little persecution) over the aggressive behaviour (strong persecution) of Africanized bees. Different factors such as similar segregations obtained for the 2 types of backcrosses (1 gentle colony: 1 aggressive colony) indicate the existence of a more complex type of inheritance. Histograms representing backcross data are discontinuous, which suggest that inheritance of the persecution trait is not governed by many genes; the possibility of polygenic inheritance with non-additive gene effects should not be excluded. (Animal Behaviour Abstracts 9(2):1758. 1981).

STORT, A.C. y BARELLI, N. Genetic study of olfactory structures in the antennae of two *Apis mellifera* subspecies. Journal of the Kansas Entomological Society 54(2):352-358. 1981. (445)

The number of antennal olfactory disc was studied in africanized and italian bees and in the descendants of their crossings. Uni-dimensional analysis showed that segment 4 of the antenna is the one with the highest discriminatory power between the two subspecies studied. Italian bees have a greater amount of olfactory structures. The data for samples of F<sub>1</sub> workers show no indication of dominance or of typical mendelian segregation. The data obtained for samples of backcross worker progeny have a normal distribution, a fact suggesting additive polygenic inheritance in the control of this trait. (Entomology Abstracts 13(9):7060. 1982).

\* SUPERBEE: A dangerous Brazilian honeybee heads North. Pest Control 40(10):56. 1972. (446)

Se ofrece información sobre las recomendaciones del Comité Especial nombrado por la Academia Nacional de Ciencias de los Estados Unidos, presentadas después de una visita a Brasil. De acuerdo a la tasa de movimiento de aproximadamente 200 millas al año, esta abeja cruzará América Central en 4 ó 6 años, por lo que urge se realicen en los Estados Unidos estudios de investigación y factibilidad, se obtengan mejores métodos para reconocer las razas y se cuente con barreras químicas y físicas que ayuden a ganar tiempo al desarrollo de medidas de combate más permanentes.

SUPER RACE. Gleanings in Bee Culture 103(5):167. 1975. (447)

SUSAETA M., . El problema de la abeja africanizada. Publicación Técnico Informativa Apícola (Chile) 2(1):24-32. 1971. (448)

\* \_\_\_\_\_ . Estudio preliminar de agresividad en colmenas de *Apis mellifera* (L.). Revista Chilena de Entomología 8:113-137. 1974. (449)

Last summer, in a transfer of larval stages, of social bees, *Apis mellifera* L. var. *ligustica* and *arnica*, from an aggressive to several non aggressive families, it was found an increase of this behaviour in the last ones; as measured after one month of the introduction of the brood into the non aggressive hives. The brood deprived hive a 4,1 pre-cubital wing index, (20 bees measured), and a negative correlation between the two sections of the said veins.

SWARM OF African bees intercepted and destroyed on ship in Richmond, California. American Bee Journal 112(8):287. 1972. (450)

SYLVESTER, H.A. Electrophoretic identification of Africanized honeybees. *Journal of Apicultural Research* 21(2):93-97. 1982. (451)

A procedure for analysing the results of protein electrophoresis for taxonomic purposes is described. Its application to identifying Africanized honeybees is presented, using previously reported data for the loci coding for malate dehydrogenase (Mdh), alcohol dehydrogenase (Adh), and a general protein band (P-3). Mdh can be used alone to identify individual workers as Africanized or European, with a probability of more than 90% for the reported populations, but it does not meet the 99% probability criterion for use as a diagnostic locus. When the reported results for all three loci are combined individual Africanized or European workers should be identifiable with a probability of more than 99%. This degree of accuracy may not be possible in other populations, not yet assayed electrophoretically. (*Apicultural Abstracts* 34(2):513. 1983).

\* TABER, S. III. The African bee in Louisiana. *American Bee Journal* 117(3):152-153, 160. 1977. (452)

El propósito de este artículo es presentar algunos comentarios sobre la experiencia adquirida por el autor con el cruzamiento de abejas por 4 generaciones utilizando semen de abeja africanizada proveniente de Brasil, en abejas europeas en Louisiana, Estados Unidos. El autor no encontró en los híbridos africanos-Louisiana conducta más agresiva que en otras abejas.

\* TAYLOR JUNIOR, O.R. y WILLIAMSON, G.B. Current status on the Africanized honey bee in Northern South America. *American Bee Journal* 115(3):92-93, 98-99. 1975. (453)

The status of *A. m. andersonii* was investigated in northern S. America in order to estimate its speed of advance. Evidence of its occurrence was not found in Venezuela, although press reports have claimed its presence. Low levels of populations were found in some areas in French Guiana and higher levels in Brazil where it has been present for longer. Advance appears to be faster in the drier coastal savannahs than the interior. This route is longer, therefore it may take *A. m. andersonii* longer to reach C. America than previously predicted. (*Entomology Abstracts* 7:5735. 1976).

\_\_\_\_\_. Past and possible future spread of Africanized honeybee in the Americas. *Bee World* 58(1):19-30. 1977. (454)

Análisis del proceso de expansión geográfica de la abeja africana por el continente americano. Informes de registros de la expansión desde 1956 a 1976 y posibles mecanismos biológicos involucrados en la misma. Direcciones, efecto de los regímenes de lluvia, temperatura y otros factores climáticos. Se concluye que estas abejas podrían llegar a los Estados Unidos en unos 13 o 20 años, pasando primero por el istmo centroamericano y México. Se cita el hecho de que existen alrededor de 500.000 colonias de abejas en el oeste de Venezuela, norte de Colombia y Costa Rica. (Jirón, L.F. y Sancho de Barquero, M.E. *Indice de publicaciones entomológicas de Costa Rica*. Index of entomological publications of Costa Rica. Edit. por Luis D. Gómez P. San José, Universidad de Costa Rica, 1983. p. 270, no. 1376).

- \* TAYLOR JUNIOR, O.R. y LEVIN, M.D. Observations on Africanized honey bees reported to South & Central American government agencies. Bulletin of the Entomological Society of America 24(4):412-414. 1978. (455)

Africanised honey bees are moving rapidly into new areas in northern South America where they are likely to cause problems for the public and beekeepers. An account is given of discussions made by the authors in March 1978 with government officials and beekeepers in French Guiana, Trinidad, Venezuela, Colombia, Panama, Costa Rica and Mexico on problems associated with africanised bees. Such bees are not regarded as a major public health hazard. The number of people likely to be stung is probably small. Nevertheless, it is possible and desirable to limit the frequency of such incidents by educating the public and authorities; a list of recommendations is presented. (Review of Applied Entomology, B 67(12):3011. 1979).

- \_\_\_\_\_. y OTIS, G. W. Swarm boxes and Africanized honeybees: some preliminary observations. Journal of the Kansas Entomological Society 51(4):807-817. 1978. (456)

Baited swarm boxes of 2 types and sizes were put up in the coastal savannas of French Guiana to attract feral swarms of Africanized bees. The boxes gave only an imprecise method of monitoring increase in the number of colonies, and control programmes based on their use were not feasible, because swarms use a variety of nest sites and often move long distances. However, the boxes are being used to stock apiaries with feral Africanized bees for research purposes. (Apicultural Abstracts 31(1):185. 1980).

- \_\_\_\_\_. y LEVIN, M.D. Observations on Africanized honey bees reported to Latin America governments. Speedy Bee 8(5):9, 12, 15. 1979. (457)

- \* \_\_\_\_\_. La pasada y futura diseminación de las abejas africanizadas en las Américas. s.l., Organismo Internacional Regional de Sanidad Agropecuaria, 1979. 22 p. (458)

Se tratan los siguientes aspectos con relación al tema: patrón de dispersión, mecanismos biológicos, velocidad de dispersión por enjambamiento, dispersión direccional, precipitación y temperatura, requerimientos climáticos, posibilidades de dispersión futura, reacciones con otra variedad o subespecie y la posición de los Estados Unidos en relación a este insecto.

- \* TECNICOS ASISTIERON a curso sobre la abeja africanizada. La Nación, San José; Feb. 28, 1984: 5c. (459)

Se suministra información sobre el curso práctico sobre abeja africanizada y su manejo, realizado en Medellín, Cartagena, Santa Marta, Barranquilla y áreas rurales colombianas, al cual asistieron 17 técnicos y apicultores costarricenses. El objetivo de este y posteriores cursos es capacitar personal nacional sobre cómo afrontar el problema de la llegada de la abeja africanizada a los países.

- THOMPSON, P.R. y HEPBURN, H.R. Changes in chemical and mechanical properties of honeybee (*Apis mellifera adansonii* L.) cuticle during development. Journal of Comparative Physiology, B 126(3):257-262. 1978. (460)

The histology of the cuticle has been described previously; properties of the cuticle have now been studied in bees up to 9 1/2 days old. The following properties of abdominal cuticle generally increased with the age of the adult bee: weight of cuticle, the amount

of protein not extracted by NaOH, elastic modulus and breaking stress (both decreased slightly from the age of 8 days), relative stiffness. The breaking strain of the cuticle as a function of age gives a plot which is the adverse of that for elastic modulus and breaking stress. The mechanical properties varied in direct proportion to the amount of protein not extracted by NaOH. Endocuticle was readily extracted with NaOH, indicating that it is not stabilized with molecular cross-links. (Apicultural Abstracts 32(1):188. 1981).

THOMPSON, P.R. Histological development of cuticle in the worker honeybee, *Apis mellifera adansonii*. Journal of Apicultural Research 17(1):32-40. 1978. (461)

The histological development of cuticle from adult worker honeybees from South Africa (*Apis mellifera adansonii*) was investigated. In order to obtain larger numbers of individuals of known age from sealed cells, a grouping system was devised and the temporal limits of the groups determined. The terminology applied to the different stages in the life cycles was also examined, and the pupal stage was found to be much shorter, and the adult stage much longer, than previously reported in the literature on *Apis mellifera*. Cuticle of the frons and scutum were similar in their patterns of differentiation and thickness, but showed certain differences from cuticle of the abdominal tergites. In general, however, the patterns of differentiation of cuticle from all three regions are similar to those found in many insects. (Entomology Abstracts 9(12):8329. 1978).

\* TOBON LOAIZA, A. et al. Biología, genética, producción y comercialización de la abeja africanizada. In Seminario Técnico sobre Abeja Africanizada, 1º, Bogotá, Colombia, 1979. Memorias. IICA. Informes de Conferencias, Cursos y Reuniones, no. 190. 1979. pp. 67-72. (462)

Informe sobre el Curso Internacional de Biología y Genética de Abejas realizado en Sao Paulo, Brasil en 1979, en lo relacionado a: 1) prácticas de manejo; 2) producción y comercialización; 3) conclusiones, y recomendaciones de los autores al Ministerio de Agricultura de Colombia en lo relacionado a la ejecución del Programa de Prevención y Control de la Abeja Africanizada en el país.

TOKYO ZOOLOGICAL PARK SOCIETY. Special issue on bees and wasps. Insectarium 13(9):193-232. 1976. (463)

Includes dispersal of the African honeybee in South America.

TOWNSEND, G.F. African honeybees (*Apis mellifera adansonii*). Apiacta 8(3):105-106. 1973. (464)

\* \_\_\_\_\_ . Colmenas de transición para el mantenimiento de la abeja africana tropical *Apis mellifera adansonii*. Apiacta 12(1):42-48. 1977. (465)

Describen los siguientes tipos de colmenas: Monte Meru que consiste en un tronco de árbol ahuecado y costado en posición longitudinal, pero excéntrico en tal forma que la posición mayor forme la parte superior y lateral de la colmena y la menor el fondo; colmena de Kenia de barra superior, variante del cesto griego con barras superiores móviles; colmena horizontal africana modificada de cuadros móviles que permite el transporte de la colonia y manejo de paneles sin romperlos; colmena Langstroth de 10 cuadros, la cual es apta para algunos trabajos de investigación. Incluye los diseños para cada tipo de colmena.



TOWNSEND, G.F. y HARNAJ, G.F.  $\sqrt{A}$  rational approach to standardization of beehive sizes<sup>7</sup>.  
In L'apiculture industrielle; Symposium International, Bucarest and Tulcea, Aout 16-24,  
1978. Bucharest, Romania, Apimondia, 1979. pp. 49-54. (466)

Incluye *Apis mellifera adansonii*.

TRIBE, G.D. y FLETCHER, D.J.C. Rate of development of the workers of *Apis mellifera adansonii* L. In Fletcher, D.J.C., ed. African bees: taxonomy, biology and economic use. Pretoria, Apimondia, 1977. pp. 115-119. (467)

\_\_\_\_\_. Drone congregation areas. Bee Line 16(6):8-9. 1979. (468)

In 1977, 9 *Apis mellifera adansonii* drone congregation areas (D) were discovered near a Pretoria apiary, usually at a distance between 1000 and 1500 m away. In 1978 drones from the apiary and from each D were regularly marked for 3 months. Drones from the apiary were found at all D sites; many were repeatedly recaptured at only one, but other drones visited several.

About 2500 drones could be marked at a D in 2 h after they had been attracted with a lure; this was estimated to be about a quarter of the drones present. Many were from feral colonies. Peak drone flight activity was usually at 15:00 h but sometimes lasted from 14:45 to 16:00. At this time many swifts and swallows preyed on the drones.

It was concluded that the 9 D really made up 2 large congregation areas, the larger covering 1 x 1.5 km. (Apicultural Abstracts 32(2):543. 1981).

VAN DER WALT, J.P. y VAN DER KLIFT, W.C. *Pichia melissophila* sp. n., a new osmotolerant yeast from apiarian sources. Antonie van Leeuwenhoek. Journal of Microbiology and Serology 38(3):361-364. 1972. (469)

Incluye *Apis mellifera adansonii*.

\* VARGAS G., C. Estamos indefensos ante la invasión ... de las asesinas. La República, San José; Set. 26, 1982:s.p. (470)

Se menciona la imposibilidad en Costa Rica de detener el avance de la abeja africanizada y la posibilidad de que el medio natural, cálido y húmedo del litoral con escasez de flores no sea el apto para el establecimiento en el país de este insecto.

\* VEGA RODRIGUEZ, C. La abeja africana tiene más de pilla que de asesina. La Nación, San José; Abril 12, 1977:18C. (471)

En reunión efectuada en el Colegio de Médicos Veterinarios del Estado Lara, Venezuela, en la cual participó el especialista en apicultura Dr. Samuel Roldán, mencionó que la abeja llamada asesina es más una aprovechadora de los panales de las demás que la hace aparecer como buena productora y como abeja pilla. Además, manifestó que aún cuando presenta una agresividad superior ésta se compensa con su alta producción de miel; un buen manejo traerá mucho provecho a los apicultores.

- \* VERGARA B., C.H. y NATES P., G. Sobre la presencia de abeja africanizada en territorio colombiano. In Seminario Técnico sobre Abeja Africanizada, 1º Bogotá, Colombia, 1979. Memorias. IICA. Informes de Conferencias, Cursos y Reuniones, no. 190. 1979. pp. 81-85. (472)

Se informa sobre las muestras de abejas y panales recogidos en Nueva Antioquia y en Trapichote, Colombia. Las abejas africanizadas observadas son relativamente mansas, sin poder generalizar esta observación a todas las que ingresan al país. Estas abejas emigran rápidamente de un lugar a otro. Los autores recomiendan formar un grupo de trabajo encargado de hacerle frente a este problema, cuyas actividades abarcarían desde aspectos biológicos hasta capacitación personal.

- \* VIDAL SARMIENTO, J.A., SANTIS, L. DE y CORNEJO, L.G. La identificación de *Apis mellifera adansonii*. (Segunda contribución). Ciencia y Abejas (Argentina) 2(7):37-45. 1974. (473)

En este trabajo, los autores establecen que la anchura de los esternitos gastrales III, V y VI, de las obreras, expresada en valores absolutos permite, ya sea la identificación de *Apis mellifera adansonii* Latreille, 1804, o establecer la presencia de su "sangre" en los híbridos correspondientes. Se agregan para ayudar al reconocimiento de dicha subespecie, fotografías de hembra, macho y obrera de la misma, procedentes del Africa y de *A. mellifera ligustica* Spinola, 1806, para comparación, como así también de trozos de panales de obreras correspondientes a ambas formas.

- VLATCOVIC, B. Morphological examination of the African bee *Apis mellifera adansonii*. In International Beekeeping Congress, 22nd, Bucharest, 1969. Report. Bucharest, Apimondia, 1969. p. 612. (474)

- VORWOHL, G. Problem of Africanized bees in South America (En alemán). Imkerfreund 29(6): 206-209. 1974. (475)

- \* WALDMAN, S.M. Algo más sobre abejas africanas. Gaceta Agrícola (México) 21(540):6, 19. 1976. (476)

Se informa sobre la importancia económica de la abeja africanizada con datos estadísticos sobre la producción de miel en Argentina. Ofrece soluciones para hacerle frente a la invasión de la abeja.

- WALTON, J. Experience with African bees. American Bee Journal 113(3):98. 1973. (477)

- WARNCKE, K. Note to the work of Ebmer on bees described as *Apis* of the genus *Halictus* and a contribution to the nomenclature of north African bees belonging to the same genus (Hymenoptera, Apidae) (En alemán). Nachrichtenbl Bayer Entomol. 25(5):89-96. 1976. (478)

- WARNER, S.J., CANTRILL, R.C. y HEPBURN, H.R. Metabolism of  $[1-^{14}C]$  palmitic acid in sealed brood of the African worker honeybee. Comparative Biochemistry and Physiology, B 68(2):355-356. 1981. (479)

The fate of  $[1-^{14}C]$  palmitic acid injected into honeybee workers was monitored throughout metamorphosis. The palmitic acid was recovered from phospholipid, mono, di, and triglycerides, steroids, free

fatty acids and cholesterol ester. The results show that triglycerides constitute the main source of fatty acids used for catabolic and anabolic reactions during worker development. (Apicultural Abstracts 33(1):114. 1982).

- WIESE, H. Normas prácticas para controlar, seleccionar e criar abelhas africanas ou agressivas. Brasil, Secretaría de Agricultura de Santa Catarina, 1968. 10 p. (480)
- \* \_\_\_\_\_ . Apiculture with Africanized bees in Brazil. American Bee Journal 117(3):166-168, 170. 1977. (481)
- \* WILLE TREJOS, A. Phylogeny and relationships among the genera and subgenera of the stingless bees (*Meliponidae*) of the world. Revista de Biología Tropical (Costa Rica) 27(2):241-277. 1979. (482)

El presente estudio trata de indicar las posibles tendencias evolutivas y las interacciones de los varios grupos de las abejas Melipónidas del mundo. También se propone una nueva clasificación para la subfamilia Meliponinae.

El trabajo demuestra que estas abejas tuvieron su centro de origen en Africa, basado en lo siguiente: 1) En Africa se encuentran las Melipónidas más primitivas, las cuales tienen un aguijón mejor desarrollado que los demás grupos; 2) La presencia de un fósil en ámbar del Báltico del Eoceno superior; 3) La aceptación general de la deriva de los continentes. El encuentro en Europa de un Melipónido fósil del Eoceno superior, hace difícil aceptar que estas abejas tuvieran su origen en América del Sur. Como es sabido, este continente se encontraba completamente aislado después de su separación con Africa durante el Cretáceo medio. El puente de unión entre Norte América y Sur América se estableció en el Plioceno. La extrema aridez del Plioceno Africano podría explicar el porqué hoy día existen relativamente pocas especies en Africa. Como prueba de esto se hace una comparación de lo que pasó con la evolución del guapinol (*Hymenaea*), que también se originó en Africa. Hoy día se conocen 16 especies de este género en América, y sólo una en Africa.

El estudio sugiere también varios paralelismos entre los géneros de las abejas Africanas con algunos grupos de los otros continentes. Por ejemplo, entre *Cleptotrigona* y *Lestrimelitta*, entre *Dactylurina* y *Tetragona*, entre *Meliplebeia* y *Plebeia* y entre *Meliponula* y *Melipona*.

La nueva clasificación que se presenta aquí trata de demostrar y defender el reconocimiento de ciertos grupos como géneros y subgéneros, al mismo tiempo que relega otros nombres a la sinonimia. En este trabajo se reconocen 8 géneros y 15 subgéneros en el género *Trigona*.

- WILLIAMS, P.J. African beekeeping, Oudtshoorn district. American Bee Journal 122(10):689. 1982. (483)
- WINNER, W. African bees - a threat or a promise? Australasian Beekeeper 76(6):133. 1974. (484)

- \* WINSTON, M.J. The establishment and spread of the Africanized honeybee in the Western Hemisphere. *Journal of the Agricultural Society of Trinidad & Tobago* 77(4):306-310, 312-313. 1977. (485)

Se suministra la siguiente información sobre la abeja africanizada: introducción a Brasil con el interés de aumentar la productividad de las abejas europeas y de su diseminación en Sur América a partir de 1956 ó 1957; características de la abeja, agresividad y manejo.

- WINSTON, M.L. y OTIS, G.W. Ages of bees in swarms and afterswarms of the Africanized honeybee. *Journal of Apicultural Research* 17(3):123-129. 1978. (486)

Observations on marked bees in swarms and afterswarms from colonies of Africanized honeybees in French Guiana, South America, showed that 80-100% of bees in the colony that were 3-8 days old left with the prime swarm. This is a much higher percentage than has been reported for European bees in Europe. Afterswarms of Africanized bees showed a similar but more variable pattern. Survival data for workers from hived swarms suggest that the high percentage of young bees in swarms may be significant for the rapid colony growth and short swarm-to-swarm intervals that are characteristics of Africanized bees. (*Apicultural Abstracts* 30(3):944. 1979).

- \_\_\_\_\_, OTIS, G.W. y TAYLOR, O.R. Absconding behavior of the Africanized honeybee in South America. *Journal of Apicultural Research* 18(2):85-94. 1979. (487)

Absconding behaviour of the Africanized honeybees in French Guiana, South America is described. Two types of absconding were recognized: disturbance-induced (i.e. predation, manipulation, etc.) and resource-related or seasonal absconding, probably induced by a dearth of resource during the wet season or by overheating during the dry season. In pre-absconding colonies where disturbance was not involved, brood rearing decreased dramatically, with few or no larvae present in colonies about ten days before absconding. Egg-laying continued at a low level until nearly all of the sealed worker brood emerged; colonies absconded within a day of the end of the sealed brood emergence. Patterns of nectar and pollen storage prior to absconding were highly variable. Inspection of colonies immediately after absconding showed that there was little (<100 cm<sup>2</sup>) or no eggs, larvae, sealed brood or stored pollen, nectar or honey. Comparison of pre-absconding and persisting colonies prior to the absconding season revealed no characteristics useful for predicting absconding, although the distributions of the last swarming dates before the absconding season were different for the two groups of colonies. Colonies that had swarmed just prior to the absconding season and that had low numbers of workers, particularly young workers, had a relatively high probability (0.45) of absconding during the wet season. (*Apicultural Abstracts* 31(2):510. 1980).

- \_\_\_\_\_. Events following queen removal in colonies of Africanized honeybees in South America. *Insectes Sociaux* 26(4):373-381. 1979. (488)

After removal of the queen from 9 colonies of Africanized bees, the workers reared new queens from eggs or larvae up to 3 days old; these were moved by workers into newly constructed queen cells. Mortality of worker eggs and larvae following dequeening was high, averaging 50%. Two-thirds of the colonies swarmed when the new queens emerged. Queen-loss swarming differed from reproductive

swarming in the lack of correlation with area of sealed brood, number of queen cells, and congestion in the colony when swarms issued. There was also a longer queenless interval. (Apicultural Abstracts 32(1):199. 1981).

WINSTON, M.L. Intra-colony demography and reproductive rate of the Africanized honeybee in South America. Behavioral Ecology and Sociology 4(3):279-292. 1979. (489)

Studies in French Guiana showed that during a reproductive cycle an Africanized honeybee colony passes through 4 phases: pre-emergence, post-emergence, pre-swarmering and post-swarmering. Swarming occurred before the growth rate of the colony reached maximum. Colonies swarmed at a small size with sufficient workers to produce viable prime swarms (about 12,500), and afterswarms (6000), as well as to continue the parent colony (7000-10000). Patterns of survivorship for both brood and adult workers shifted during swarming cycles, with high brood mortality and reduced adult lifespan early in the cycle in contrast with lower brood mortality and increased lifespan of adults as colonies matured. High mortality occurred at points in the swarming cycle, at which there was a high mean worker age and a low proportion of young workers. During the cycle there was a progressive increase in the proportion of young workers, resulting in swarms that were populated predominantly by young workers. (Apicultural Abstracts 34(1):180. 1983).

\* \_\_\_\_\_ . The potential impact of the Africanized honeybee on apiculture in Mexico and Central America. American Bee Journal 119(9):642-645. 1979. (490)

The author predicts that these bees will have colonized all of Central America and Mexico within 8-10 years, creating such serious problems for beekeepers that many will give up beekeeping. This pessimistic view of the effect of Africanized honeybees is not shared by all apiculturists. The main problems envisaged by the author are: there will be insufficient apiary sites for the more aggressive bees; honey crops will be smaller because of more frequent swarming and absconding; in this area there is little queen rearing or experience in requeening, which are necessary for the management of Africanized bees. It is suggested that, before the arrival of these bees, the steps outlined in a report by Taylor and Levin (1978) should be taken, viz: establishment of a centre for queen rearing and selection; instruction of beekeepers in suitable management techniques, and background education about Africanized bees; relocation of apiaries. (Apicultural Abstracts 32(3):906. 1981).

\_\_\_\_\_ y TAYLOR, O.R. Factors preceding queen rearing in the Africanized honeybee (*Apis mellifera*) in South America. Insectes Sociaux 27(4):289-304. 1980. (491)

Factors which may initiate queen rearing and swarming in colonies of Africanized honeybees, include colony size (comb area, worker population), patterns of comb utilization, congestion of brood and adult workers in the brood nest, and worker age distribution. Factors not associated with queen rearing and swarming include volume of the potential nesting cavity and the ratio of nurse bees to brood (a measure of available brood food). A new multifactorial hypothesis for the initiation of swarming in honeybees is presented, based on intrinsic (demographic) and extrinsic (resource abundance) factors acting as primary stimuli to initiate queen rearing. (Apicultural Abstracts 33(1):144. 1982).

WINSTON, M.L. Seasonal patterns of brood rearing and worker longevity in colonies of the Africanized honey bee (Hymenoptera: Apidae) in South America. *Journal of the Kansas Entomological Society* 53(1):157-165. 1980. (492)

\* \_\_\_\_\_, TAYLOR, O.R. y OTIS, G. W. Swarming, colony growth patterns, and bee management. *American Bee Journal* 120(12):826-830. 1980. (493)

A multifactorial hypothesis for the initiation of queen rearing is presented, based on results from studies of swarming by Africanized bees in South America and by unmanaged European bees in Kansas. This hypothesis suggests that the success of some swarm control methods is due to their alteration of colony structure which prevents or stops queen rearing.

Beekeepers should discourage after-swarms (costs) by destroying all but one queen cell, or preferably by requeening the colony, immediately after the issue of a prime swarm. Also, to offset the higher mortality in brood and young workers during this period (particularly in Africanized bees) the addition of 2 frames of emerging sealed brood to the colony is recommended. Two such frames given to a hived swarm, or to package bees, or to divisions of a colony, can also help to offset the forthcoming population reduction. (*Apicultural Abstracts* 33(1):146. 1982).

\_\_\_\_\_, DROPKIN, J.A. y TAYLOR, O.R. Demography and life history characteristics of two honey bee races. *Oecologia* 48(3):407-413. 1981. (494)

Intra-colony demography and life history characteristics of neotropical Africanized honeybees in French Guiana, and temperate European honeybees in Kansas, USA, were studied under simulated feral conditions. Major differences in colony demography were found which nevertheless resulted in some similar reproductive characteristics. European colonies were larger than Africanized colonies, had more rapid initial growth rates of worker populations, showed better survival of brood and adult workers, and differed in patterns of worker age distribution. However, both races were similar in the brood and adult populations when colonies swarmed, the frequency and timing of swarming, and the number of worker in prime swarms. The factors most important in determining these colony growth and reproductive patterns were probably worker mortality rates, climate and resource availability. (*Apicultural Abstracts* 33(1):137. 1982).

\* \_\_\_\_\_ y KATZ, S.J. Longevity of cross-fostered honey bee workers (*Apis mellifera*) of European and Africanized races. *Canadian Journal of Zoology* 59(8):1571-1575. 1981. (495)

In Venezuela, groups of 100 newly emerged workers of each race were introduced into colonies of the other race; length of life was compared between the races and also workers in colonies of their own race. Although mean lifespans of Africanized (A) workers are usually shorter than for European (E) bees, it was found that E workers in A colonies had a significantly shorter life than A workers in either E or A colonies. One cause may be that these E workers started foraging earlier. The results may provide a partial explanation for the success and impact of Africanized bees in South America. (*Apicultural Abstracts* 33(4):1254. 1982).

\_\_\_\_\_, TAYLOR, O.R. y OTIS, G.W. Some differences between temperate European and Tropical African and South-American honeybees. *Bee World* 64(1):12-21. 1983. (496)

- WOLNIEWICZ, E. Verdades sobre las abejas africanizadas. Gaceta del Colmenar (Argentina) 33(377):276-280. 1971. (497)
- WORRALL, A. Is the Langstroth brood chamber deep enough for African bees? South American Bee Journal 53(4):9-10. 1981. (498)
- \* WOYKE, J. African honey bees in Brazil. American Bee Journal 109(9):342-344. 1969. (499)
- \_\_\_\_\_. Experiences with *Apis mellifera adansonii* in Brazil and in Poland. Apiacta 8(3):115-116. 1973. (500)
- \* \_\_\_\_\_. Laranja: a new honeybee mutation. The Journal of Heredity 64(4):227-230. 1973. (501)

The recessive laranja (*la*) eye mutation is lighter in drones than in workers; it is not allelic to, or linked with, brick (*bk*), chartreuse (*ch*), garnet (*g*), or umber (*i<sup>u</sup>*), and it is not linked to cordovan (*cd*) or the sex alleles. It is epistatic to brick and interacts with chartreuse to produce light buff eyes, with garnet to produce umber eyes, and with umber, white eyes. All of the interaction phenotypes with *la* were lighter than those of the interacting mutations. The eye color of homozygous mutant diploid drones was the same as that of haploid drones. Thus, no gene compensation was detected, and the diploid drones showed the male character with respect to laranja.

- \_\_\_\_\_. Genetic balance, heterozygosity and inheritance of size of tests in diploid drone honey bees (*Apis mellifera adansonii*, *Apis mellifera ligustica*). Journal of Apicultural Research 13(2):77-91. 1974. (502)

- \_\_\_\_\_. Comparative biometrical investigation on diploid drones of the honeybee. II. The thorax. Journal of Apicultural Research 17(4):195-205. 1978. (503)

A total of 10,758 measurements were made on the thorax and its appendages of 269 haploid and 295 diploid drones, 109 queens, and 248 workers. All individuals originated from 12 queens of *Apis mellifera ligustica*, *A.m. adansonii*, their backcrosses and some hybrids. The structure measured were mostly larger in diploid than in haploid drones. The number of bristles on the forewing and the number of hooks on the hindwing were lower in diploids, and the cubital index was similar in the two types of drone. The relationships for the same characters in queen and workers were different, diploid drone characters were variously super-male, male or female, or caste characters. (Apicultural Abstracts 30(4):1320. 1979).

- \_\_\_\_\_. Comparative biometrical investigation on diploid drones of the honeybee. III. The abdomen, and weight. Journal of Apicultural Research 17(4):206-217. 1978. (504)

A total of 9268 measurements were made on abdominal segments, 4 and 5 of 271 diploid and 264 haploid drones, 109 queens and 236 workers, originating from 12 queens of *Apis mellifera adansonii*, *Apis mellifera ligustica* and some crosses. Also 518 diploid and haploid drones were weighed individually.

Abdominal segments of diploid drones were larger than those of haploids. Out of 12 characters studied, 4 were smaller in the females,

and as many as 8 were larger in at least one female caste, than those in the haploid drones. Therefore the size of certain abdominal parts of diploid drones showed different relations from those of haploids and females. Four segment sizes showed super-male character and out of 8 others, 4 showed caste character, 2 intersec, 1 female and 1 super-female character. The pure race diploid drones were about 25% heavier than the haploid showing a super-male character. (Apicultural Abstracts 30(4):1321. 1979).

WOYKE, J. Qué se hace en El Salvador para evitar el peligro de las "abejas asesinas". San Salvador, El Salvador, Ministerio de Agricultura y Ganadería, 1980. 6 p. (505





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