
JAMES E. KEIRANS¹ & J. MATHEWS POUND²

¹ U.S. National Tick Collection, Institute of Arthropodology and Parasitology, Georgia Southern University, Statesboro, Georgia 30460-8056, U.S.A.

² Knipling-Bushland U.S. Livestock Insects Research Laboratory, Agricultural Research Service, U.S. Department of Agriculture, Kerrville, Texas 78028-9184, U.S.A.

Corresponding author: jkeirans@gasou.edu

Abstract

Since the first published description of *Otobius megnini*, the spinose ear tick, by Dugès in 1883, its importance primarily as a pest of cattle and horses has lead to the publication of numerous research articles, as well as pamphlets, leaflets, brochures and other informative printings. The following annotated bibliography is the first attempt to gather references to these writings into a single alphabetically organized document as an historical aid to those interested in furthering their knowledge or research efforts on this species. During the 132 years from the first published reference to this tick in 1868 through the year 2000, we have found and referenced 928 writings. The initial fourth of these were written during the 71 years from 1868 through 1939, with publication efforts during the second, third and fourth quartiles being quite similar and requiring 21 (1940 through 1960), 19 (1961 through 1979), and 21 years (1980 through 2000), respectively. Owing perhaps to the species originating in the southwestern U.S. and spreading southward into Mexico and South America, >90% of the citations are written in English (753 or 81.1%) or Spanish (85 or 9.3%). The remaining publications are in French (4.8%), German (2.8%), Portuguese (0.6%), Russian (0.5%), Afrikaans (0.3%), Italian (0.2%), Danish (0.1%), Croatian (0.1%) and Turkish (0.1%). Although efforts were made to reference as many publications as possible, the authors welcome additional citations and corrections to those already included.

Key words: *Otobius megnini*, (Argasidae), annotated bibliography

Introduction

The spinose ear tick, *Otobius megnini*, is a one-host ectoparasite primarily of large wandering ungulates, and is thought to have had its original center of distribution in the arid lands of southwestern North America. The fact that the larva and two nymphaal stages of this tick feed deep within the ears of their host for long periods of time has allowed the distribution of this ectoparasite to countries and, indeed, continents where it was not originally part of the natural fauna. When the second stage nymphs have completed feeding, they drop from the host to the ground and molt to adults. Males and females of this tick are non-parasitic, and mating occurs off the host.
It is speculated that from its center of distribution, *O. megnini* was introduced into Central and South America on both cattle and horses, and there is anecdotal evidence that, because of the need for horses during the Boer War, *O. megnini* was imported into South Africa in the ears of horses from South America or perhaps Mexico. Another scenario is that after the Boer War, cattle from the United States infested with *O. megnini* were imported into South Africa. From South Africa, this tick has spread to Madagascar, Lesotho, Botswana, Namibia, Zimbabwe, Zambia, Malawi, Nigeria and the Democratic Republic of Congo, although some of these country records may well be independent introductions. It has also been speculated that *O. megnini* arrived in India in the mid-1930s on cattle or horses from southern Africa.

The scope of this bibliography is from the original description by Dugès in 1883 to 2000, although there is one reference from 1868 that most likely refers to the spinose ear tick. While many, if not most, authors cite the date of publication for *Otobius megnini* as 1884, we have found otherwise. The original publication by Dugès brackets the years from 1882-1884. However, M. P. Mégnin in his publication on ticks of Mexico (Mégnin, P. 1883. Les garrapatas du Mexique. Comptes-Rendu des Séances de la Société de Biologie, 35, 7s, 5, 489-491), cited Dugès original description and publication. The “séance” or meeting at which Mégnin presented his paper was held on July 28, 1883 under the presidency of M. Bouley, and Mégin wrote, “M. Dugès a parfaitement reconnu que ce parasite n’appartient pas au genre *Ixodes*, mais bien au genre *Argas*...et il me fait l’honneur de me le dédier en le nommant *Argas Megnini* dans *La Naturaleza* T. V, p. 195, 1883, ou il le décrit.” We, therefore, consider 1883 as the correct date for the publication of this taxon.

As in any study of bibliography, it is nearly impossible to find all references dealing with the subject, especially when one is working with several editions of a particular book; some editions are easily found, others impossible to locate. Also, because this tick species is an important parasite of livestock, the same is true of the numerous leaflets, pamphlets, brochures, and circulars, often in several printings, issued by the Agriculture Departments of both National and State Governments.

Where the title of an article on *O. megnini* clearly describes the content of the article, no annotation is given. Where we have not been able to actually see a particular reference to *O. megnini*, we have so indicated in the annotation. In many of the earlier publications, authors have placed *Otobius* in the genera *Argas, Rhynchoprium*, or *Ornithodoros*, also occasionally spelled *Ornithodorus*. In our annotations we have standardized the nomenclature and used only the generic name *Otobius*.

It is possible that one or more supplements to this bibliography may appear when additional references become available, or when corrections need to be made. Therefore, we shall be most grateful to anyone who brings to our attention, and sends us copies for annotation, any additional publications on *O. megnini*, either prior or subsequent to the year 2000, or who finds any mistake or oversight in the present text material.

### Annotated bibliography (1883-2000) of the spinose ear tick, *Otobius megnini* (Dugès, 1883)

Abbott, R. T. (1941) Spinose ear tick is found on cattle in the territory. *Hawaii Farm and Home*, 4, 14, 30. (*O. megnini* on cattle in Hawaii.)


1943). pp. 64-73. (There have been sporadic occurrences of *O. megnini* in different areas of the U.S.A., but nothing approaching an outbreak.)


Ahrens, E. H. (1967) Controlling the gulf coast tick with insecticide impregnated ear tags. *The Cattleman*, 2 pp. (*Amblyomma maculatum* should not be confused with the soft (spinose) ear tick which can be found in the inner ear canals of cattle and horses.)

Alcaino, H., Gorman, D. T. & Jiménez, F. (1990) Ecología del *Rhipicephalus sanguineus* (Ixodidae) en la región metropolitana de Chile. *Archivos de Medicina Veterinaria*, 22, 159-168. (Brief mention that *O. megnini* is found in Chile. The article is about *R. sanguineus*.)


Alexander, A. S. (1909) Ear ticks. [Reply to query]. *Breeder's Gazette*, 56, 1396. (A subscriber asked for information on cattle being troubled with ticks in their ears. Reply - "The ear tick (*ornithodoros* [sic] *megnini*), otherwise known as the 'spinose' tick, or 'spider' tick, is found in the South and Middle West. It causes great irritation indicated by shaking of the ears and head and general nervousness of affected animals. It seems to cause the most trouble in the horse. The best treatment is to flood out the ticks with olive oil or other bland oil. The oil closes the breathing tubes and suffocates the tick.")

Alexander, J. O'D. (1984) *Arthropods and human skin*. Berlin, Springer-Verlag, x + 422 pp. (*O. megnini*, p. 369, incorrect data that the adult stage is found in the ears of its host; p. 371, *O. megnini* listed in a table as only found in South Africa; p. 377, cited Peacock (1958) on *O. megnini* and tick paralysis.)

Alicata, J. E. (1941) Spinose ear tick is found on cattle in the Territory. *Hawaii Farm and Home*, Oct. 1941, 15, 30. (First record of *O. megnini* from the territory of Hawaii. The ticks were imported to Oahu from the island of Hawaii.)


Alicata, J. E. & Cuckler, A. C. (1943) Parasitology problems. *Report of the University of Hawaii Agricultural Experiment Station*, (1941-42), 44-51. (*O. megnini* was found on 45% of the cattle examined. As many as 65 ticks were found in one ear. Fully engorged nymphs molted to adults in 7-8 days after removal from the cattle. Copulation of adult ticks occurred 2 days after molting, and eggs were deposited 5 days after adult emergence.)

14-15. (Nine bighorn sheep were examined from southern New Mexico. The tick species found were *D. albipictus* and *O. megnini.*

Allen, R. W. (1955) Parasites of mountain sheep in New Mexico with new host records. *Journal of Parasitology, 41,* 583-587. (Post-mortem examination of 9 *Ovis canadensis mexicana* showed that 2 sheep were positive for *O. megnini.*

Allen, R. W. (1962) Extent and sources of parasitism in pronghorn antelope. *Transactions of the Interstate Antelope Conference (Boise, Idaho, Dec. 4-6),* 13, 48-51. (O. megnini, p. 48, occurs in the ears of pronghorn antelope. It is also listed in Table 1.)


Alwar, V. S. (1970) Ticks and disease of livestock in India. *Madras Veterinary College Annual,* 28, 1-5. (*O. megnini* is one of the tick species recorded from India, and some observations on its life history were recorded by Sen in 1937.)

Amberg, E. (1910) *Ornithodoros megnini* Duges [sic] im Gehörgang. *Archiv für Ohrenheilkunde,* 82, 273-274. (Dr. N. Mac A., while in Mexico from January-March, 1908 became parasitized by *O. megnini*. The tick was removed from his ear in Detroit, Michigan.)


Anderson, J. R. (1974) Symposium on reproduction of arthropods of medical and veterinary importance. II. Meeting of the sexes. *Journal of Medical Entomology, 11,* 7-19. (On p. 11 *O. megnini* in a table of Acari that mate off the host; p. 12 reference to Hooker et al. (1912) and that *O. megnini* reportedly hides in cracks and periodically stoms or rattles when she is ready to mate.)


Annand, P. N. (1945) Report of the Chief of the Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, 1944. *United States Department of Agriculture, Washington, D. C.*, 56 pp. (*O. megnini* killed under salt troughs by spraying them with equal parts of kerosene and motor oil, and applying non-drying adhesives impregnated with insecticides to the ears of cattle, sheep and goats. These adhesive ear patches gave protection for 90-120 days.)

Anonymous. (1921) Spinose ear tick. *Journal of the Department of Agriculture, Union of South Africa,* 3, 15. (*O. megnini* recorded from Avoca, Cape Province. The tick was taken from the ear of a Friesland calf. This area is not considered favorable for the spinose ear tick, and it was apparently introduced.)

Anonymous (1941) Summary for 1940. *United States Department of Agriculture Bureau of Entomology, Insect Pest Survey Bulletin,* 20, 559-591. (*O. megnini* was found on 40% of the sheep and cattle examined on the Edwards Plateau of Texas. On ranches, the ears of cattle were treated to reduce subsequent infestation by the screwworm, *Cochliomyia hominivorax.*)

Anonymous Date? Title? *Cooperative Plant Pest Report,* 1, 351-378. (First record of *O. megnini* in Arkansas. It was found in Van Buren County. *O. megnini* reference not verified.)

Anonymous (1953) Guide for controlling external parasites of livestock and poultry in Texas. *Texas A & M Agricultural Extension Service Bulletin C-3,* 1-7. (The spinose ear tick is picked up by livestock around mineral boxes, feed troughs or watering troughs. To eliminate these breeding
sites, remove the boxes or troughs periodically and spray with creosote or a mixture of one-half crankcase oil and one-half kerosene.)


Anonymous (1962) Ticks. In. Research Report 1928-1961. Entomology Laboratory, Kamloops, British Columbia Research Branch, Canada Department of Agriculture, Ottawa, Ontario, pp. 7-10. (O. megnini has been shown to be a parasite of up to 50% of the deer in certain areas of British Columbia, and has caused a dozen cattle deaths recently.)


Anonymous (1991) Tick information sheet: The spinose ear tick. Veterinary Clinics North America Small Animal Practice, 21, 141-143. (Gives distribution and seasonal activity, hosts and location on host, life cycle summary, and diseases. They report O. megnini established on the Galapagos Islands, which we cannot confirm.)


Aragão, H. de B. (1935) Observações sobre os Ixodideos da República Argentina. Memórias do Instituto Oswaldo Cruz, 30, 519-553. (O. megnini comprise lots 14, 24, 25, 59 and 63. The date of the original description of O. megnini by Dugès is incorrectly stated to be 1876.)


Ash, L. S. & Oliver, Jr., J. H. (1989) Susceptibility of Ornithodoros parkeri (Cooley) [sic] (Acari: Argasidae) and Dermanyssus gallinae (DeGeer) (Acari: Dermanyssidae) to Ivermectin. Journal of Medical Entomology, 26, 133-139. (Twelve species of ticks in the families Ixodidae and Argasidae are susceptible to Ivermectin. Only O. megnini is reported to be unaffected - see Craig & Kunde.)

August, J. R. (1988) Otitis externa. A disease of multifactorial etiology. Veterinary Clinics of North America: Small Animal Practice, 18, 731-742. (Larvae of O. megnini remain in the ear canal for 1-7 months. Larvae and nymphs may induce severe inflammation by feeding on blood and
lymph from the skin of the ear canal.)

Babcock, O. G. (1920) Some common parasites of livestock in Colorado. *Colorado Agricultural College Extension Bulletin*, s. 1(166A), 1-19. (*O. megnini* occurs in Colorado on stock shipped from infected territories, and is apparently well established in southeastern Colorado.)

Babcock, O. G. & Boughton, I. B. (1943) Sulfur-feeding tests for the control of ectoparasites of animals. *Journal of the American Veterinary Medical Association*, 103, 209-212. (Feeding sulfur to calves appeared to have no effect on *O. megnini* in the ears of these animals.)


Bacha, W. J., Jr. (1957) *The life history of Otobius lagophilus*. *Journal of Parasitology*, 43, 560-565. (*Otobius lagophilus* has one nymphal stage as opposed to *O. megnini* which, as Brumpt has pointed out, has 2 nymphal stages.)


Baker, D. W. (1946) Ticks found in New York State. *Cornell Veterinarian* 36, 84-90. (*O. megnini*, fig. 17, is often found on cattle and sometimes on horses shipped into New York State.)


Baker, M. K., Ducasse, F. B. W., Sutherst, R. W. & Maywald, G. F. (1989) The seasonal tick populations on traditional and commercial cattle grazed at four altitudes in Natal. *Journal of the South African Veterinary Association*, 60, 95-101. (*O. megnini* was rare and confined mostly to traditional farming areas at higher altitudes. It was active in the cooler months.)

Balashov, Yu. S. (1961) The structure of digestive organs and blood digestion in the Argasidae. *Parazitologicheskiy Sbornik Zoologicheskiy Institut. Akademiya Nauk SSSR*, 20, 185-225. [In Russian; NIH translation] (The mouthparts of larval and nymphal *O. megnini* are in a terminal position, unlike most argasids. Females of *O. megnini* go through a single gonadotropic cycle at the expense of the nymphal feeding, and die.)


Banks, N. (1908) A revision of the Ixodoidea, or ticks, of the United States. *United States Department of Agriculture, Bureau of Entomology Technical Series*, No. 15, 1-61. (*O. megnini* key, p. 16; description, p. 17, pl. I., figs. 9-12, recorded from Arizona, California, Idaho, Iowa, Louisiana, Nevada, New Mexico and Texas.)


Barbará, B. & Dios, R. L. (1920) Contribucion al estudio de la sistematica y biologia de los Ixodidae de la Republica Argentina y de algunos paises vecinos. *Revista Sociedad de la Medicina Veterinaria, Buenos Aires*, 5, 21-55. (Same data as immediately above.)

Barroso, S. M. (1922). (Reference not verified.)

Batte, E. G. (1972) Differential diagnosis of parasitic dermatitis of cattle. *Journal of the American Veterinary Medical Association*, 161, 1265-1268. (The ear canals of cattle become filled with ear wax and *O. megnini* sucking blood. Secondary bacterial infection may result and open the danger of screw worm infestation.)

Bay, D. E. & Harris, R. L. (1988) *Introduction to veterinary entomology*. Bryan, Texas, Stonefly Publishers. iii + 111 pp. (*O. megnini*, p. 75, fig. 9.6, incorrect statement that cottontail and jack rabbits serve as hosts for this tick. They are hosts for *O. lagophilus*.)


Beck, M. D., Bell, J. A., Shaw, E. W. & Huebner, R. J. (1949) Q fever studies in Southern California. II. An epidemiological study of 300 cases. *Public Health Reports*, 64, 41-56. (In the U.S.A., Coxiella burneti has been found to occur naturally in 4 tick species, *Amblyomma americanum, Dermacentor andersoni, D. occidentalis* and *O. megnini*.)


Becklund, W. W. (1968) Ticks of veterinary significance found on imports in the United States. *Journal of Parasitology*, 54, 622-628. (*O. megnini* found on antelope, gemsbok, nyala, sable antelope, and zebra from Southwest Africa (Namibia), on cattle from Mexico, and on horses from Peru and Venezuela.)


partly from New Mexico and partly from Virginia. For 7 years they intermixed, and 55 adult cattle were infested with *O. megnini* from a herd of 320.)


Bedford, G. A. H. (1913) A tick new to South Africa. *Second Report of the Director of Research, Department of Agriculture, Union of South Africa*, for 1912, 343-344. (*O. megnini* found in the ears of cattle at Vryburg, and ears of sheep at Fauresmith, where the natives call them "Koning der Luizen," or King of the Lice.)

Bedford, G. A. H. (1917) The spinose ear tick. *Union of South Africa Department of Agriculture Local Series*, No. 18, 1-6. (Control of *O. megnini* using an insecticidal liquid of 2 parts each of Stockholm tar and oil to one part of turpentine. Apply one teaspoon to one tablespoon in each ear, depending on the size of the animal.)


Bedford, G. A. H. (1926) The sheep ked (*Melophagus ovinus* Linné). *Journal of the Department of Agriculture Union of South Africa*, 12, 484-490. (Like *O. megnini*, the sheep ked has only recently become an important pest in the Transvaal.)


Bedford, G. A. H. & Graf, H. (1939) Bosluise, Siektes wat hulle oordra, en die Bestryding daarvan. (Same as immediately above but in Afrikaans.)
Boeredery in Sud-Afrika, Maart 1939. (Herdruk No. 24), 1-10. (Same as immediately above but in Afrikaans.)


Bell, E. J., Parker, R. R. & Sto ener, H. G. (1949) Q fever. Experimental Q fever in cattle. American Journal of Public Health, 39, 478-484. (Results to date are indefinite on transmission of Q fever to cows by infected O. megnini.)


Benbrook, E. A. (1959) Outline of parasites reported for domesticated animals in North America. 5th revised ed. Ames, Iowa, Iowa State College Press, 67 pp. (O. megnini, p. 66, found on horse, cattle, sheep, goat, swine, dog, cat, man, coyote, deer, elk, mountain goat, mountain sheep, rabbit, ostrich.)


Bentley, G. M. (1937) Ear tick (Ornithodoros megnini Duges) [sic]. Insect Pest Survey Bulletin, 17, 328. (“The spinose ear tick has been reported at one residence in Knoxville, Tennessee, owing to a badly infested dog. The ticks are occurring in the cracks of the walls and in and around the loose joints of shelving in cabinets.”)

Bequaert, J. C. (1946) The ticks, or Ixodoidea, of the northeastern United States and eastern Canada. Entomologica Americana (new series) 25, 73-184. (O. megnini, pp. 131-132. Collections from man’s ear, New York after his return from Mexico, and from a calf shipped from Texas to Ohio. Also citation of the Hagen (1887) reference.)

Berge, T. O. & Lennette, E. H. (1953) World distribution of Q fever: Human, animal and arthropod infection. American Journal of Hygiene, 57, 125-143. (O. megnini in Table I, shown to be naturally infected with the causitive agent of Q fever - citation of the Jellison, Bell et al. (1948) reference.)


Bhaskar, C. G. & Joseph, S. A. (1985) The spinose ear tick of horse. Centaur, 2, 1, 9-10. (A female O. megnini lays 500-600 eggs in crevices or under stones; larvae hatch in 18 days or more and will feed in ears of their hosts for 7-8 months.)

Bishop, F. C. (1935) Ticks and the role they play in the transmission of diseases. Smithsonian Institution Publication, No. 3276, 389-406. (O. megnini, p. 399, pl. 3, fig. 1.)


Bishop, F. C. & Hixon, H. (1936) Biology and economic importance of the gulf coast tick. Journal of Economic Entomology, 29, 1068-1076. (This article is about Amblyomma maculatum, a tick frequently found in ears of cattle and called the “gotch tick” or the “ear tick.” However, the name ear tick is more commonly used for O. megnini. The authors incorrectly list Koch as the
author for *O. megnini.*


Boddicker, M. L., Huggins, E. J. & Richardson, A. H. (1971) Parasites and pesticide residues of mountain goats in South Dakota. *Journal of Wildlife Management,* 35, 94-103. (In this survey the only tick species recovered was *Dermacentor andersoni,* but *O. megnini* is listed in a table reviewing parasites from mountain goats in North America.)


Boero, J. J. (1945) Los ixodídeos de la República Argentina. Revista de Medicina Veterinaria, 26, 1-10. (Information on O. megnini as cited immediately above.)


Boero, J. J. (1965) Las garrapatas del bovino. Revista de Medicina Veterinaria, 46, 87-96. (O. megnini listed, p. 96, as one of the tick species found on cattle.)


Botha, P. (1992) Lyme borreliosis in southern Africa. In, Fivaz, B., Petney, T. & Horak, I. (eds.) Tick vector biology. Medical and veterinary aspects. Berlin, Springer. pp. 127-133. (*Borrelia burgdorferi* was not isolated from O. megnini in a large horse-riding school in Natal Province, South Africa, where seropositive cases were identified in 3 riders, the owner, 1 of 4 stable hands, 71 of 117 horses and 5 of 11 dogs.)


Brandborg, S. M. (1955) Life history and management of the mountain goat in Idaho. Idaho Department of Fish and Game Wildlife Bulletin, 2, 1-142. (Three nymphs of O. megnini were found in the outer ear of a female mountain goat on the Salmon River, Idaho.)


Brennan, J. M. (1945) Field investigations pertinent to Bullis fever. Preliminary report on the species of ticks and vertebrates occurring at Camp Bullis, Texas. Texas Reports on Biology and Medicine, 3, 112-121. (Nymphs and larvae of O. megnini were infrequently collected on deer.)

Broom, R. (1920) Note on the spinose ear tick (Ornithodorus megnini Dugès) in the human ear in
South Africa. *Journal of Laryngology*, 35, 362-363. (*O. megnini* found in the ear of a five-year-old child.)


Bruce, W. G. (1952) Screw-worms. In, *Insects. The yearbook of agriculture*. Washington, D.C., United States Department of Agriculture. p. 670. ("Especially troublesome are the bites of the Gulf Coast tick or the ear tick which attack cattle, sheep and goats.")

Brumpt, E. (1936) *Précis de parasitologie*, vol. II. Paris, Masson et Cie, pp. 1083-2139. (*O. megnini*, p. 1208, fig. 664; 1209, fig. 665.)


Brumpt, E. & Brumpt, L. C. (1939) Identité du spirochète des fièvres récurrentes à tiques des plateaux mexicains et du *Spirocheta turicatae*, agent de la fièvre récurrente sporadique des États-Unis. *Annales de Parasitologie Humaine et Comparée*, 17, 287-298. (*O. megnini* was collected in 1938 in Mexico, but because it is a one host tick and does not feed as adults, the authors consider that it cannot be involved in the transmission of relapsing fever, which was first diagnosed in Mexico in 1936.)


Bück, G. (1948) Tiques des animaux domestique à Madagascar. *Bulletin Agricole, Tananarive*, 1, 3-11. (*O. megnini*, pp. 4-5, figs. 1, 2.)


Bulman, G. M. & Walker, J. B. (1979) A previously unrecorded feeding site on cattle for the immature stages of the spinose ear tick, *Otobius megnini* (Dugès, 1844)[sic]. *Journal of the South African Veterinary Association*, 50, 107-108. (*O. megnini* feeding under the tails as well as in
the ears of dairy cattle in Bolivia.)

Burchard, L., Larenas, N. & Ramos, P. (1984) Otoacariasis humana por *Otobius megnini* en Calama, Chile. *Boletín Chileno de Parasitología*, 39, 15-16. (*O. megnini* found in the ear cavity of 2 patients, one adult and one child) in Calama, northern Chile.)


Bustamante, M. E., Varela, G. & Ortiz Mariotte, C. (1946) II. Estudios de fiebre manchada en Mexico. *Fiebre manchada en la laguna*. *Revista del Instituto de Salubridad y Enfermedades Tropicales*, 7, 39-49. (In a survey for spotted fever rickettsia, lot numbers 13 and 14 contained 4 nymphs and 2 nymphs, respectively, of *O megnini*.)

Buxton, P. A. (1945) The use of the new insecticide DDT in relation to the problems of tropical medicine. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 38, 367-400. (He cites the DDT research of Rude and Smith (1944) - see below, working with *O. megnini* and *Amblyomma maculatum*.)


Cary, C. A. (1907) Texas or tick fever. *Alabama Agricultural Experiment Station Bulletin*, No. 141, 109-186. (*O. megnini*, p. 145, found in the South and West, fig. 4, no. 6, 6a, b.)

Černý, V. (1966) Nuevas garrapatas (Ixodoidea) en Aves y reptiles de Cuba. *Poeyana*, serie A, No. 26, 1-10. (*O. megnini* listed as one of the tick species found in Cuba.)


Černý, V. (1969) The tick fauna of Cuba. *Folia Parasitologica*, 16, 279-284. (Mentions that Pérez Vigueras (1934) cited one finding of *O. megnini* in the province of Havana, and later the same author (1956) reported that it was rare. Černý found no specimens in Cuba during his survey.)

Černý, V. & Málková, D. (1988) Results of the Czechoslovak-Cuban cooperation concerning inves-
tigations of ticks and arboviruses transmitted by ticks. *Folia Parasitologica*, 36, 93-96. (*O. megnini* listed in table 1 as present in 1956, but not in 1987.)

Chamberlin, W. J. (1937) The ticks of Oregon. *Oregon State College Agricultural Experiment Station Bulletin*, No. 349, 1-34. (*O. megnini*, pp. 5, 12, fig. 3. The species is rare in Oregon.)


Chandler, A. C. (1922) *Animal parasites and human disease*, 2nd ed. New York, John Wiley. xiii + 572 pp. (*O. megnini*, p. 365, fig. 160, is found in southwestern United States and Mexico, and is now becoming common in parts of South Africa.)


Chandler, A. C. (1949) *Introduction to parasitology with special reference to the parasites of man*, 8th ed. New York, John Wiley & Sons, Inc. xii + 756 pp. (*O. megnini*, p. 531, nymphs remain attached in ears of horses and other domestic animals, and sometimes children, for months; p. 550, DDT is effective against newly hatched or molted ticks but has little effect on others. However, 8% DDT in grease with 25% sulfur added is effective against *Amblyomma maculatum* and *O. megnini* in the ears of animals.)

Chandler, A. C. (1955) *Introduction to parasitology with special reference to the parasites of man*, 9th ed. New York, John Wiley & Sons, Inc. xiv + 799 pp. (The spiny nymphs of *O. megnini*, p. 558, fig. 171D, can remain attached in the ears of horses and other animals, and sometimes children, for months. Adults are nonparasitic.)


Chaudhuri, R. P. (1962) Field tests with some newer insecticides for the control of the one-host cattle tick *Boophilus microplus* (Canes.). *Indian Veterinary Journal*, 39, 420-428. (Brief mention that in the U.S.A., 0.5% malathion was effective against unfed and engorged *O. megnini*.)

Chaudhuri, R. P. (1969) Ticks infesting livestock in India, their importance to leather industry and their control. In, *Biological aspects of leather manufacture*. Madras, CLRI. pp. 221-231. (*O. megnini* found in Madhya Pradesh, but not listed as an important livestock tick.)

Chavarria Chavarria, M. (1941) Garrapatas determinadas en México. Caracteres genéricos de las más comunes. *Revista del Instituto Pecuario*, 1, 18-24. (*O. megnini* is common in Mexico and found on 100% of domestic animals.)

ina Veterinaria Universidad Nacional Mayor de San Marcos (Lima), 15, 48-68. (O. megnini, p. 49, cited under parasites of horses, and p. 51 under parasites of cattle.)

Chellappa, D. J. (1973) Note on spinose ear tick infestation in man and domestic animals in India and its control. Madras Agricultural Journal, 60, 656-658. (Two cases of O. megnini in the ears of humans, and parasitic on cattle and a dog in India.)

Chellappa, D. J. & Alwar, V. S. (1972) On the incidence of Otobius megnini (Duges, [sic] 1883) on sheep in India. Cheiron, 1, 114-115. (First recovery of O. megnini from sheep, Tamil Nadu, India.)

Chinery, W. A. (1973) The nature and origin of the "cement" substance at the site of attachment and feeding of adult Haemaphysalis spinigera (Ixodidae). Journal of Medical Entomology, 10, 355-362. (It is not known whether a cement substance is found at the feeding site in argasid ticks, and it would be interesting to know whether or not a cement substance is secreted by the slow-feeding nymphs of O. megnini.)


Cheng, T. C. (1973) General parasitology. New York, Academic Press. xxv + 965 pp. (O. megnini, pp. 736, 737, fig. 20.7b, 739, found in western parts of the United States, South America, South Africa, India and do doubt in other parts of the world.)


Chorley, J. K. (1939) Report of the Division of Entomology for the year ending 31st December, 1938. Rhodesia Agricultural Journal, 36, 598-622. (O. megnini found in the Salisbury district in May infesting the ears of cattle and sheep.)

Christophers, S. R. (1906) The anatomy and histology of ticks. Scientific Memoirs by Officers of the Medical and Sanitary Departments of the Government of India (New Series), No. 23, 55 pp. (O. megnini, p. 4, briefly mentioned as attacking humans in Mexico.)


Clark, R. (1938) A note on paralysis in lambs caused apparently by Rhipicephalus evertsi. Journal of the South African Veterinary Medical Association, 9, 143-145. (Brief mention of O. megnini in case II found on cattle.)


Cobbett, N. G. (1953) Small garden sprayer facilitates treating range cattle for ear ticks. Cattleman, 40, 154-156. (A 2 gallon garden sprayer, equipped with a modified nozzle and shoulder sling, can be used for applying lindane plus xylol to the ears of cattle in a confined chute for the control of O. megnini.)

Cohen, M. (1926) Ear-bushsticks as a human parasite. South African Medical Record, 24, 559. (Four cases of ticks in human ears. "The popular remedy for this disease is usually a mixture of milk and tobacco instilled into the ear.")

544-545. (O. megnini egg laying data from Hooker et al. (1912) reference.)


Cooley, R. A. (1916) Fourteenth annual report of the State Entomologist of Montana. University of Montana Agricultural Experiment Station Bulletin, No. 112, 55-76. (O. megnini, p. 67, "One of the surprises of the past year was the discovery of the Spienose [sic] ear tick on cattle in eastern Montana").

Cooley, R. A. (1923) The spotted fever tick. Dermacentor venustus Banks. Special Bulletin Montana State Board of Health, No. 26, 9-17. (In 1916 O. megnini was found in eastern Montana in the ears of cattle. It has not been found in recent years.)

Cooley, R. A. (1932) The Rocky Mountain wood tick. Dermacentor variabilis Banks. Special Bulletin Montana State Board of Health, No. 268, 9-17. (In 1916 O. megnini was found in eastern Montana in the ears of cattle. It has not been found in recent years.)

Cooley, R. A. & Kohls, G. M. (1940) Two new species of Argasidae (Acarina: Ixodoidea). Public Health Reports, 55, 925-933. (Detail of characters separating Otobius lagophilus from O. megnini. Also discussion of the collections of O. megnini by Hadwen in 1913 and Parker in 1916.)

Cooley, R. A. & Kohls, G. M. (1944) The Argasidae of North America, Central America, and Cuba. The American Midland Naturalist, Monograph No. 1, 152 pp. (O. megnini, pp. 21-31, pl. 2; figs. 6-10. The United States records are from Arizona, California, Colorado, Idaho, Kansas, Kentucky, Louisiana, Missouri, Montana, Nebraska, New Mexico, North Carolina, Oregon, South Dakota, Texas, Washington, and Wyoming.)

Cooper Research Organization (1970) Cattle tick control. Berkhamsted, England, Cooper McDougall & Robertson Ltd. 65 pp. (O. megnini, p. 8, map 6, larvae and nymphs parasitic within host's ears for several months, drop to the ground, mate and produce eggs without further feeding.)


Courdurier, J., Bück, G. & Quesnel, J. J. (1952) Recherches sur la "Q fever" à Madagascar. 1ère note: recherches sérologiques. Bulletin de la Société de Pathologie Exotique, 45, 602-604. (Brief mention that O. megnini and Amblyomma variegatum are found on Madagascar.)


Cowdry, E. V. (1925) A group of microorganisms transmitted hereditarily in ticks and apparently unassociated with disease. Journal of Experimental Medicine, 41, 817-830. (Unfed larvae of O. megnini, p. 825, table I, were found with microorganisms, indicative of hereditary transmis-
Cowdry, E. V. (1925) A group of microorganisms transmitted hereditarily in ticks and apparently unassociated with disease. Department of Agriculture, Union of South Africa, 11-12 Report of the Director of Veterinary Education and Research, part 1, 161-177. (Data on *O. megnini* as immediately above.)


Cuckler, A. C. (1943) Sheep parasites. *Hawaii Agricultural Experiment Station Report*, 1941-42, 49. (Of 60 sheep from the island of Kahoolawe, Hawaii, 43 were parasitized by *O. megnini*.)


Davis, G. E. (1942) Tick vectors and life cycles of ticks. *American Association for the Advancement of Science*, Publication No. 18, 67-76. (*O. megnini*, p. 67, reported from Peru, but not incriminated in the transmission of relapsing fever to man.)

Deer, J. A. (1951) Control of ticks infesting cattle. *Texas A. & M. Leaflet*, L-136, 2 pages (unpaginated). (*O. megnini* can be controlled in the ears with stock 1029 applied with a one-inch paint brush.)


Derrick, E. H. (1953) The epidemiology of "Q" fever: a review. *The Medical Journal of Australia*, 1, 245-266. (In Table I, the record by Jellison, Bell et al. (1948) of *O. megnini* infected with
Coxiella burneti is cited.

Descazeaux, J. (1925) Sur la présence au Chili de l’Ornithodoros megnini. Bulletin de la Société de Pathologie Exotique, 18, 408-409. (First record of O. megnini in Chile.)


Diaz-Ungria, C. (1957) Nota sobre las especies de Acarina de Venezuela. Revista de Sanidad y Asistencia Social, 22, 457-468. (O. megnini listed as one of the 39 tick species and subspecies in Venezuela.)


Dikmans, G. (1945) Check list of the internal and external animal parasites of domestic animals in North America. American Journal of Veterinary Research 6, 211-241. (O. megnini listed in Tables 2, 4, 6, 8, & 10, as an external parasite of horses, mules & asses (2), cattle (4), swine (6), sheep & goats (8) and dogs & cats (10).)

Dingler, L. A. (1939) Manera de distinguir las garrapatas que transmiten la piroplasmosis bovina o ranilla, de aquellas que nunca la transmiten. El Agricultor Mexicano, 55, 24-26. (O. megnini is a common tick in the ears of cattle, horses, sheep and dogs. Each monthly issue of this journal has the same pagination. This article appeared in the June issue.)


Dobson, S. J. & Barker, S. C. (1999) Phylogeny of the hard ticks (Ixodidae) inferred from 18S rRNA indicates that the genus Aponomma is paraphyletic. Molecular Phyllogenetics and Evolution, 11, 288-295. (O. megnini briefly mentioned - fig. 1 from Black et al., 1997; p. 289, fig. 2, but not important to the results of this publication.)

Donoso Barros, R. (1954) Ixodoidea de Chile. Revista Chilena de Entomología, 3, 132-134. (O. megnini listed as one of 9 species of Ixodida found in Chile.)


megnini is listed under the various countries where this tick is found.)

Dove, W. E. (1938) Screwworm control. United States Department of Agriculture Leaflet, 162, 1-6. (O. megnini found in arid sections of the Southwest; attaches deep in the ears of cattle and the resultant wound leads to screwworm infestations.)

Dove, W. E. (1943) Screwworm control. United States Department of Agriculture Leaflet, 162 (revised), 1-6. (Same as immediately above.)

Drewek, J., Jr. (1980) Behavior, population structure, parasitism, and other aspects of coyote ecology in southern Arizona. Ph.D. dissertation, University of Arizona, Tucson, Arizona. 277 pp. (Of the ectoparasites infesting coyotes, the only tick species found was O. megnini.)

Drummond, R. O. (1964) Tests with insecticides for the control of the spinose ear tick, Otobius megnini in cattle. Folia Entomologica Mexicana, (7-8), 70-71 [abstract]. (Of a number of insecticides and formulations tested on the ears of cattle for control of larval and nymphal O. megnini, coumaphos (Coral) dust appeared the most effective.)

Drummond, R. O. (1967) Seasonal activity of ticks (Acarina: Metastigmata) on cattle in southwestern Texas. Annals of the Entomological Society of America 60, 439-447. (Although argasid ticks do not have seasonal fluctuations that are as well defined as ixodids, O. megnini in central Texas appears to have a peak of activity in late summer-early fall.)

Drummond, R. O. (1985) Effectiveness of Ivermectin for control of arthropod pests of livestock. Southwest Entomologist Supplement, 7, 34-42. (Ivermectin is effective for controlling arthropod pests of livestock. However, it is not an effective control measure for nymphs of O. megnini in the ears of cattle and horses.)

Drummond, R. O. (1985) New methods of applying drugs for the control of ectoparasites. Veterinary Parasitology 18, 111-119. (Insecticides in oil or as aerosols can be applied into the ears of cattle to control O. megnini.)


Drummond, R. O., Whetstone, T. M. & Ernst, S. E. (1967) Insecticidal control of the ear tick in the ears of cattle. Annals of the Entomological Society of America, 60, 1021-1025. (Twenty-six insecticides at various concentrations and formulations were tested on the ears of cattle to control larval and nymphal O. megnini.)

Dreyer, K., Fourie, L. J. & Kok, D. J. (1997) Predation of livestock ticks by chickens as a tick-control method in a resource-poor urban environment. Onderstepoort Journal of Veterinary Research, 64, 273-276. (Boophilus decoloratus, Hyalomma marginatum rufipes, Rhipicephalus evertsi evertsi and O. megnini were recovered from crops and gizzards of chickens at necropsy, showing that chickens are natural predators of livestock ticks.)

Dreyer, K., Fourie, L. J. & Kok, D. J. (1998) Tick diversity, abundance and seasonal dynamics in a resource-poor urban environment in the Free State. Onderstepoort Journal of Veterinary Research, 65, 305-316. (In and around the urban, small-scale farming communities of Botshabelo and Thaba Nchu, adult ticks were removed from the right side of 10 cattle monthly at 5 localities. Ten tick species were identified and O. megnini accounted for 1.85% of the total of 244,538 ticks collected.)

Duckworth, C. U. (1942) Division of animal industry. 23rd Annual Report of the California Department of Agriculture Bulletin, 31, 257-286. (O. megnini was one of 4 tick species found on cattle by personnel at the animal pathology laboratory in Sacramento.)

Department of Agriculture Bulletin, 32, 338-350. (*O. megnini, Dermacentor spp., and Boophilus annulatus* were found on cattle by personnel at the animal pathology laboratory in Sacramento.)


Dugès, A. (1892) Un nuevo ixodídeo. *Naturaleza*, 2, 164-167. (Brief mention of 2 species he described, *Argas turicata* and *Argas megnini*.)

Dugès, A. (1902) *Trichodectes geomydis*, Osborn var. *expansus* Alf. Dug. *Memorias de la Sociedad Científica "Antonio Alzate"*, 18, 185-195. (Following the description of the subspecies of Mallophaga, the author lists and gives diagnoses of Mexican ticks, including *O. megnini*, figs. 7-12.)

Du Toit, R. (1938) The external parasites of sheep. II. Tick pests. *Farming in South Africa*, 13, 435-440. (General article on the life cycle of *O. megnini*, but incorrectly states that there is a single nymphal stage.)


Du Toit, R. & Theiler, G. (1964) Ticks and tick-borne diseases in South Africa. *Department of Agricultural Technical Services Republic of South Africa Scientific Bulletin* No. 364, 1-28. (Discussion of *O. megnini*, pp. 4-5, 24. It is not a disease transmitter but is responsible for considerable economic losses.)


Eads, R. B. (1948) Ectoparasites from a series of Texas coyotes. *Journal of Mammalogy*, 29, 268-271. (*O. megnini* listed in the text (p. 268) as one of 6 tick species collected from *Canis latrans*, but *O. megnini* is not listed in Table 1 where the other 5 tick species are cited.)

Eads, R. B. & Campos, E. G. (1984) Human parasitism by *Otobius megnini* (Acari: Argasidae) in New Mexico, USA. *Journal of Medical Entomology*, 21, 244. (Seven cases of nymphal *O. megnini* from humans near Gallup, New Mexico.)


Eddie, B., Radovsky, F. J., Stiller, D. & Kumada, N. 1969. Psittacosis-Lymphogranuloma Venereum (PL) agents (*Bedsonia, Chlamydia*) in ticks, fleas, and native mammals in Califor-
nia. *American Journal of Epidemiology*, 90, 449-460. (*O. megnini* was collected from cattle ranches in Mariposa and 2 sites in Marin Counties. Twenty-four pools (326 ticks) were tested by mouse inoculation for PL isolates. All tests were negative.)

Eddy, G. W. & Joyce, C. R. (1942) Ticks collected on the Tama (Iowa) Indian Reservation with notes on other species. *Iowa State College Journal of Science*, 16, 539-543. (Mention of Banks's (1908) statement that *O. megnini* has been collected in Iowa at Ames and Davenport. Specimens are in the Museum of Comparative Zoology, Harvard, and in the Marx Collection of the National Museum of Natural History. The specimen deposited in the Marx Collection is now in the U. S. National Tick Collection at Georgia Southern University and is a nymph - RML 120651; Marx 14.)


Edwards, M. A. (1975) The chaetotaxy of the pedipalps and legs of some larval ticks (Acari: Argasidae). *Transactions of the Zoological Society of London*, 33, 1-75. (In *O. megnini*, both legs and palps show a marked setal reduction. It is assumed that this reduced setal complement may be due to the fact that the tick does not have to seek a new host for each instar. The setal patterns are illustrated.)

Eichler, W. (1980) *Grundzüge der veterinärmedizinischen Entomologie*. Jena, Gustav Fischer Verlag. 184 pp. (*O. megnini*, p. 44, is a vector of the rickettsia of Q fever; larvae and nymphs are parasitic in the ears of domestic animals.)


Escalante, J. A. & Mollinedo, L. (1989) Ocho artrópodos de interés veterinario en el Cusco. *Revista Peruana de Entomología*, 31, 46-47. (The authors report 10 female *O. megnini* in the ears of "vacunos" at Anta, Departamento del Cusco, Peru. The ticks were undoubtedly nymphs and not females.)

Escomel, E. (1924) *Essai sur la Parasitologie d’Aréquipa (Pérou) et de ses environs*. *Bulletin de la Société de Pathologie Exotique*, 17, 906-925. (Recurrent fever caused by *Spirochaeta (Treponema) recurrentis* is possibly transmitted by *O. megnini* and *Argas persicus.*)


Ewing, H. E. (1929) *A manual of external parasites*. Springfield, Illinois, Charles C. Thomas. xiv + 225 pp. (*O. megnini*, p. 74, fig. 45, with the incorrect statement that there is only one nymphal instar.)


Facchin, C. M., Gervasoni, S., Picco, E. J., Boggio, J. C. & Peralta, J. L. (1998) Efecto de la doramectina en el control de Otobius megnini en terneros. Revista Fave, 12, 1-4. (There was no significant reduction in the numbers of O. megnini in the ears of treated and control calves.)

Fairchild, G. B., Kohls, G. M. & Tipton, V. J. (1966) The ticks of Panama (Acarina: Ixodoidea). In, Wenzel, R. L. and Tipton, V. J. (eds.) Ectoparasites of Panama. Chicago, Field Museum of Natural History. pp. 167-219. (O. megnini included in the key, p. 170, “as it is possible that it may eventually turn up in the drier parts of Panama.”)


Fantham, H. B., Stephens, J. W. W. & Theobald, F. V. (1920) The animal parasites of man. New York, William Wood and Company. xxxii + 900 pp. (O. megnini, p. 510, pain caused by specimens in the ears of humans, citing the Simpson article in Lancet, and the 1893 Townsend article. It has recently been found in South Africa (Bedford, 1913), and incorrectly stated to be found in the Sudan.)


Fisher, W. F. & Wilson, G. I. (1977) Precipitating antibodies in cattle infested by Psoroptes ovis (Acarina: Psoroptidae). Journal of Medical Entomology, 14, 146-151. (Extracts of 28 nymphal O. megnini were prepared and tested with sera of O. megnini infested cattle. Reactions with the O. megnini extracts and cattle blood extracts were considered nonspecific.)


Fivaz, B. H., Botha, P. & Cairns, L. M. (1991) A putative outbreak of equine Lyme borreliosis in Natal. Journal of the South African Veterinary Association, 61, 128-129. (Large numbers of O. megnini were found on the horses, but no Borrelia spp. were isolated.)


Flores Flores, R. & Menchaca Treviño, R. (1972) Evaluación de tres insecticidas sistémicos para el control de la garrapata de la oreja Otobius megnini (Duges) [sic] y piojos del ganado. Folia Entomologica Mexicana, 23/24, 90-91. (The insecticides tested were asuntol, dursban and nankor. Asuntol showed the best results.)

Food and Agriculture Organization. (1956) Report of the joint FAO/OIE meeting on the control of


Foreyt, W. J. & Leathers, C. W. (1986) Traumatic reticulopericarditis in a mule deer. *Journal of Wildlife Diseases*, 22, 446. (At necropsy, a female mule deer collected in Okanogan County, Washington was found to have 30 *Dermacentor albipictus*, and in the ear canals 76 *O. megnini*.)


Ganagarajah, M. (1976) A preliminary check-list and host list of ticks of Zambia. *National Council for Scientific Research, Lusaka, Pest Research Report*, PR 1, 1-16. (Seven genera and 59 tick species have been recorded on vertebrates in Zambia, including *O. megnini*.)
nian Entomological Society, 19, 381-414. (O. megnini on the islands of Hawaii, Kahoolawe, 
Maui and Oahu.)

Gaxiola, C. S. M., Borbolla, I. J. E., Quintero, M. M. T., Rentería, G. R., Aceves, L. R., Guerrero, L. 
nitens en equinos del Lienzo Charro de Bachigualato y Colonia Bachigualato de Culiacán, 
Sinaloa, México. In, 4th Congress Internacional Parasitologia Animalas, Puerto Vallarta, 
Jalisco, México, pp. 223-224. (Three equines (7.5%) were positive for O. megnini at 
Bachigualato, whereas 37 equines (92.5%) were positive at Lienzo Charro.)

Institute of Virology, (new series) 1, 8-10. (The use of systemic insecticides, such as trichlorfon, 
famphur, imidan and fenthion, may be useful for the control of certain tick species in India, 
such as O. megnini.)

Ixodoidea). Indian Journal of Animal Sciences, 67, 566-574. (O. megnini is found on artiodac-
ytls, dogs and man in the states of Madhya Pradesh, Maharashtra and Tamil Nadu.)

Georgi, J. R., Georgi, M. E. & Theodories, V. J. (1990) Parasitology for veterinarians, 5th ed. Phil-
adelphia, W. B. Saunders Co. viii + 412. (O. megnini, p. 49, fig. 1-63. “One of my former stu-
dents reported that he had suffered several painful attacks by Otobius”.)

Gerhart, L. A. (1948) Serena - the benevolent bovine tells about the new ear tick remedy, The Catt-
leman, [volume & page number unknown]. (Recommends one part benzene hexachloride, 2 
parts xylol, and 17 parts pure pine oil for the control of O. megnini in the ears of cattle.)

Gladney, W. J. (1978) Ticks (Acarina: Argasidae and Ixodidae). In, Bram, R. A. (compiler) Survei-
lance and collection of arthropods of veterinary importance. United States Department of 
Agriculture Agricultural Handbook, No. 518. Chapter XVI, pp. 102-113. (O. megnini has a one 
host life cycle and individual ticks may remain within the ear for as long as 121 days.)

Glover, (1938) Western Farm Life, 40, 2 (O. megnini reference not verified.)

Glover, (1941) Western Farm Life, 43, 8 (O. megnini reference not verified.)

Florida, CRC Press, 422 pp. (Case history, pp. 314-315, of O. megnini attaching to the ear 
Drum of a camper at Mexican Hat, Utah.)

231 pp. (O. megnini, p. 78, fig. 2. In the index it is cited as 78f.)

and Forestry Experiment Station Bulletin, No. 935, 1-15. (O. megnini found in Warren County 
on cattle in November and December.)

and Forestry Experiment Station Research Highlights, 48, 1-3. (O. megnini, pp. 1-2.)

culture and Human Resources. Research Extension Series, 075, 1-75. (O. megnini found on the 
islands of Hawaii, Kahoolawe, Maui, Molokai and Oahu.)

Goldsmid, J. M. (1963) Ticks infesting dogs in the Salisbury area of Southern Rhodesia. Journal of 
the South African Veterinary Medical Association, 34, 609-610. (Of 931 ticks collected on dogs 
in what is now Harare, Zimbabwe, only 3 nymphs of O. megnini were found.)

Blackwell Scientific Publications, 353 pp. (O. megnini briefly mentioned in chapter XLII as
sometimes found in the ears of humans. Mentioned also in subsequent printings of this book in 1969, 1972 and 1976.)
Gothe, R. (1981) Tick toxicosis of cattle. Current Topics in Veterinary Medicine, 6, 587-598. (Cattle paralysis is caused by the argasid species Ornithodoros savignyi in Nigeria and Chad and by O. megnini in British Columbia and California.)
Gray, G. G. & Pence, D. B. (1979) Ectoparasites of sympatric Barbary sheep and mule deer in the Texas panhandle, U.S.A. Journal of Medical Entomology, 16, 448-449. (The recovery of O. megnini on 3 of 11 Aoudads or Baribary sheep (Ammotragus lervia) represents a new host record for this tick species.)
Gregson, J. D. (1942) Notes on the laboratory rearing of some Canadian ticks (Acarina). Proceedings of the Entomological Society of British Columbia, 39, 32-35. (The author believes it doubtful that O. megnini can be bred in the laboratory.)
Gregson, J. D. (1953) Insects, ticks and mites attacking livestock and man. Proceedings Seventh Pacific Science Congress, 4, 141-146. (O. megnini a potential pest of livestock in Canada, but to date only recorded from mountain sheep and deer in British Columbia.)
Gregson, J. D. (1960) Ticks of medical importance in British Columbia. British Columbia Medical Journal, 2, 1-4. (O. megnini commonly infests wild deer and sheep and has killed cattle in British Columbia. "It is unique in that the adults have been heard to emit a distinct tapping noise. Thus, some ticks even tick!"
Griffin, C. E. (1981) Otitis externa. Compendium on Continuing Education for the Practicing Veterinarian, 3, 741-752. ("Although occasionally otitis externa is the only manifestation of infestation, there are usually other signs. This is especially true with Sarcoptes scabei (Figure 2) and Otobius megnini, the spinous [sic] ear tick").
Guberlet, J. E. (1919) National Farmer, 41, 3 (O. megnini reference not verified.)
Guérin (1868) Corps étranger de loreille datant du 1er décembre 1866 (Méxique). Sorti le 4 juillet
1867; ayant vécu après sa sortie deux mois environ. *Gazette des Hôpitaux Civils et Militaires*, 41, 19. (Although this article was published 15 years prior to the description of *O. megnini*, its content about a foreign body in a man's ear in Mexico almost certainly refers to the spinose ear tick.)


Guglielmone, A. A. & Mangold, A. J. (1986) La distribución geográfica de *Otobius megnini* (Dugès, 1884) (Acarina: Ixodoidea: Argasidae) en la Argentina. *Veterinaria Argentina*, 3, 582-587. (*O. megnini* was collected throughout the year, but most nymphs were found in autumn and winter and larvae in the spring in areas with less than 600 mm of annual rainfall.)


Hagen, H. A. (1887) A living *Ixodes* said to have been four months in the ear of a man. *Entomologica Americana*, 3, 124-125. (See Bequaert, 1946 entry.)

Hailey, T. L., Thomas, J. W. & Robinson, R. M. (1966) Pronghorn die-off in trans-Pecos Texas. *Journal of Wildlife Management*, 30, 488-496. (Due to malnutrition there was a die-off of pronghorn antelope in southern Texas. All antelopes examined were infested with *O. megnini*.)

Hair, J. A. (1978) How can ticks (Ixodides) be controlled on cattle? *Research Report Oklahoma Agricultural Experiment Station*, 768, 33-37. (*Tick species included are Amblyomma americanum, A. maculatum, Dermacentor albipictus and O. megnini.*)

Hair, J. A. (1997) Tick biology: key facts and practical aspects. *International Forum on Ticks and Tick-borne Diseases. A supplement to Compendium on Continuing Education for the Practicing Veterinarian*, 19, 7-9. (*O. megnini* in the waxy environment of the ear tends to repel most chemicals that are applied, resulting in inadequate exposure of this species to the product. Insecticides in light-weight oils mix more efficiently with ear waxes and afford the best approach to control.)

Hair, J. A., Stacey, B. R. & Teel, P. D. (1978) Evaluation of ear [sic] devices for gulf coast tick and horn fly control. *Folia Entomologica Mexicana*, 39/40, 198. (Populations of *O. megnini* declined after treatment with ear devices after one month, but this may have been due to completion of engorgement and drop off of nymphs.)


Hall, M. C. (1925) Parasites and parasitic diseases of sheep. *United States Department of Agriculture Farmers' Bulletin*, No. 1330, 1-35. (*O. megnini*, pp. 9, fig. 8, found most often in the southwestern U.S.A. Photo from Imes, 1918.)

Hall, M. C. (1928) A calendar of livestock parasites. *United States Department of Agriculture Miscellaneous Publication*, No. 25, 1-14. (*O. megnini*, fig. 1. "Animals badly infested with ear ticks (fig. 1) are likely to die late in the winter or early in the spring.")


Harwood, R. F. & James, M. T. (1979) *Entomology in human and animal health*, 7th ed. New York, Macmillan. vi + 548 pp. (*O. megnini*, pp. 391-392, is widely distributed in the warmer parts of the USA and in British Columbia, Canada. It is also a serious problem in South America, South Africa and India.)

Hearle, E. (1938) The ticks of British Columbia. *Scientific Agriculture*, 18, 341-354. (Two females cited as *Ornithodoros megnini* from jackrabbits in southern Alberta are, according to Gregson...
Hearle, E. (1938) Insects and allied parasites injurious to livestock and poultry in Canada. *Farmers’ Bulletin, Dominion of Canada Department of Agriculture*, No. 53, 108 pp. (The record of *O. megnini*, p. 100, from jackrabbits in southern Alberta was actually *O. lagophilus*.)

Henderson, B. L. (1940) Ear-tick and screw-worm control in the South. *Coastal Cattleman*, 6, 17. (*O. megnini* can be controlled with a contact oil, and screw-worm flies with a repellent. Bone oil appears to be effective for both the tick and the fly.)

Herms, W. B. (1915) *Medical and veterinary entomology*, 1st ed. Macmillan, New York, xii + 393 pp. (*O. megnini*, p. 328, fig. 201, found commonly in California and other subtropical parts of the United States and Mexico.)

Herms, W. B. (1917) Contribution to the life-history and habits of the spinose ear tick, *Oribatodoros megnini*. *Journal of Economic Entomology*, 10, 407-411. (Female lived 355 days in a glass vial at room temperature. Discussion of *O. megnini* in ear of a human.)

Herms, W. B. (1923) *Medical and veterinary entomology*, 2nd ed. New York, Macmillan. xiv + 462 pp. (*O. megnini*, p. 386, fig. 202, nymphs drop from their hosts in midsummer or early autumn and mating takes place within a day or two of the final molt. Oviposition takes place 14-42 days after mating.)

Herms, W. B. (1939) *Medical entomology with special reference to the health and well-being of man and animals*, 3rd ed. New York, Macmillan. xix + 582 pp. (Herms kept a female *O. megnini* alive in a pill box for 2 years and 7 months, p. 426; pp. 467-468, life cycle, damage treatment, fig. 172.)

Herms, W. B. (1948) Ticks (Acarina-Ixodoidea) in the causation of animal disorders and as vectors of disease, with some observations on relapsing fever in California. *Proceedings 4th International Congress on Tropical Medicine and Malaria, Washington, D.C.*, 2, 1645-1653. (Otacariasis - invasion of the auditory canal is caused by *O. megnini*, and the author kept an adult female ear tick alive without food for 2 years and 7 months.)


Herms, W. B. (1961) *Medical entomology*, 5th ed., revised by James, M. T. New York, Macmillan. xi + 616 pp. (*O. megnini*, p. 21, invades the ears of man and many animals; p. 439, nymphs known to feed for months; p. 441, Herms kept a female *O. megnini* alive without food for 2 years, 7 months in a pill box; p. 481, distribution and life history, fig. 157.)


Herrero, M. V. (1989) Eficiencia reproductiva de las hembras de *Otobius megnini* (Acarí: Argasidae). *Revista de Biología Tropical*, 36, 429-431. (A female *O. megnini* lays 856 plus or minus 225 eggs, with a preoviposition period of 3.2 plus or minus 1.4 days and an oviposition period of 105.4 plus or minus 18.1 days, with 20.0 plus or minus 4.8 ovipositions per female.)


Hewitt, C. G. (1915) A contribution to a knowledge of Canadian ticks. *Transactions of the Royal
**Society of Canada, Series iii, ix, section 4, 225-239.** (O. megnini on jackrabbits at Lethbridge, Alberta. The first record north of Oregon and Idaho. But see Hadwen, 1913.)

Hirst, S. (1917) *Species of Arachnida and Myriopoda (scorpions, spiders, mites, ticks and centipedes) injurious to man.* London, Trustees of the British Museum. 60 pp. (O. megnini, pp. 41-42, fig. 18.)

Hirst, S. (1920) *Species of Arachnida and Myriopoda (scorpions, spiders, mites, ticks and centipedes) injurious to man.* London, Trustees of the British Museum. 60 pp. (O. megnini, pp. 41-42, fig. 18.)

Hoelscher, C. E. (1985) *External parasites of cattle.* Texas A & M Agricultural Extension Service Bulletin B-1080, 1-24. (O. megnini is the only soft tick that commonly attacks cattle in Texas. It also frequently parasitizes horses, mules, sheep, goats, hogs, dogs and cats, and on several occasions has been removed from the ears of humans.)

Hoffmann, A. (1959) Algunos aspectos sobre la biología e importancia médica de las garrapatas. Yoliliztli, 2, 11-21. (O. megnini is common in Mexico and found in the ears of its hosts.)


Hoffmann, A. & López-Campos, G. (2000) *Biodiversidad de los ácaros en México.* Mexico City, Conabio, Universidad Nacional Autónoma de México. 230 pp. (O. megnini, p. 48, is the most common argasid in Mexico, and is found in all states of the Republic.)

Hoffmann, C. C. (1930) Monografías para la entomología medica de México. Anales del Instituto de Biología, 1, 135-164. (O. megnini recorded from the big horn sheep but without specific locality.)

Holland, W. J. (1898) Concerning ticks. Canadian Entomologist, 30, 96-97. (Mention of a tick in the ear of a friend who slept all summer on the ground in New Mexico. Holland cited the species as *Ixodes bovis* (*Boophilus annulatus*), but it was undoubtedly *Otodius megnini*, because the tick-infested person stated that, “These creatures are often found in the ears of cattle and occasionally of horses”.)

Honess, R. F. & Winter, K. B. (1956) Diseases of wildlife in Wyoming for those interested in the diseases and parasites of the wild animal. Wyoming Game and Fish Commission Bulletin, No. 9, 1-279. (O. megnini recorded from the bighorn sheep but without specific locality.)

Hoogstraal, H. (1952) Biological factors of ticks (Ixodoeidea) of the Ethiopian faunal region in relation to human injury and disease. Transactions of the Ninth International Congress of Entomology, 1, 959-963. (O. megnini is almost entirely confined to domestic animals, ostriches, and sometimes to man in dry parts of South Africa and spottily elsewhere.)


Hoogstraal, H. (1956) *African Ixodoidea. I. Ticks of the Sudan (with special reference to Equatoria Province and with preliminary reviews of the genera Boophilus, Margaropus, and Hyalomma).* Department of the Navy, Bureau of Medicine and Surgery, Washington, D. C. 1101 pp. (O. megnini, p. 32, erroneous identification - see King 1911, but the tick could be introduced into the Sudan.)

Research Unit Number Three (NAMRU-3), Cairo, Egypt, U.A.R. v + 498 pp. (O. megnini references scattered throughout.)


Hoogstraal, H. (1972), (published 1973) The influence of human activity on tick distribution, density, and disease. *Wiadomości Parazytologiczne*, 18, 501-511. (O. megnini, in the immature stages, escapes notice feeding deep within the ears of horses, and was distributed from North America to Australia, Asia, Africa and Madagascar. Hoogstraal uses O. megnini as just one example of his general rule of tick distribution - "If a species occurs in two different Faunal Regions or on two different continents, man has been responsible.")


Hoogstraal, H. (1976) Class Arachnida. In, Hunter, G. W., Swartzwelder J. C. & Clyde, D. C. (eds.) *Tropical medicine*, 5th ed. Philadelphia, W. B. Saunders Co. Chapter 69, pp. 712-729. (Colorado tick fever virus has been isolated from O. megnini Cooley and Kohls, p. 719. Hoogstraal appears to have mixed up the 2 species of Otobius. Colorado tick fever virus has been isolated from Otobius lagophilus, and Cooley and Kohls are the authors of that taxon. His statement is not true for O. megnini.)

Hoogstraal, H. (1978) *Bibliography of ticks and tickborne diseases from Homer (about 800 B.C.) to 31 December 1976*, Volume 5, Part II. Special publication April 1978, United States Naval Medical Research Unit Number Three (NAMRU-3), Cairo, Egypt, U.A.R., iii + 455 pp. (O. megnini references scattered throughout.)


Hook, W. A. (1909) Some host relations of ticks. *Journal of Economic Entomology*, 2, 251-257. (Incorrect statement that *O. megnini* drops off the host after the first molt.)

Hook, W. A. (1909) The geographical distribution of American ticks. *Journal of Economic Entomology*, 2, 403-428. (*O. megnini* found in the states of Arizona, California, Idaho, Iowa, Kentucky, Kansas, Louisiana, Nebraska, Nevada, New Mexico, Oklahoma and Texas, and in Mexico and Brazil.)


Hopla, C. E. (1955) Observations on the life history of a rabbit tick (*Otobius lagophilus*). *Journal of the Kansas Entomological Society*, 28, 114-116. (Larval *O. lagophilus* were sensitive to high humidity, apparently similar to *O. megnini* in this respect.)


Hourrigan, J. L. (1977) Babesiosis bovina - control y erradicación de la garrapata de la fiebre del ganado en los Estados Unidos de America. *Revista Veterinaria Venezolana*, 41, 66-77. (*O. megnini* mentioned in a list of ticks that are occasionally imported into the United States.)


Howell, D. E., Stiles, G. W. & Moe, L. H. (1943) The fowl tick (Argas persicus), a new vector of anaplasmosis. American Journal of Veterinary Research, 4, 73-75. (Boynton, Herms and Howell (unpublished) failed to transmit anaplasmosis to fowl using Ornithodoros coriaceus and Otobius megnini. Attempts to transmit the agent of anaplasmosis experimentally in cattle by means of O. megnini were unsuccessful.)

Hughes, T. E. (1959) Mites or the Acari. London, The Athlone Press, vii + 225 pp. (O. megnini, p. 49, is incorrectly stated to feed only in the larval stage, molt directly to the adult stage and then proceed to reproduce.)

Hunt, L. M. & Gilbert, B. N. (1981) Ticks found on white-tailed deer from different ecological areas of Texas. Southwestern Entomologist, 6, 341-345. (The authors state that the first report of O. megnini on white-tailed deer was made by personnel at the Rocky Mountain Laboratory in 1943. However, no specimens of O. megnini were found in the present survey.)


Integrated Control of Ticks and Tick-borne Diseases. (1999) Review of journal article by Dreyer et al., 1998. Newsletter on Ticks and Tick-borne Diseases of Livestock in the Tropics, No. 11, 1-36. (O. megnini, p. 11, was one of the species cited in the article.)

Irons, J. V., Eads, R. B., Johnson, C. W., Walker, O. L. & Norris, M. A. (1952) Southwest Texas Q fever studies. Journal of Parasitology, 38, 1-5. (Two cows in a dairy herd were proven shedders of Coxiella burneti, yet several pools of O. megnini collected from them were negative for the organism. (But see Philip & Burgdorfer, 1961). Three O. megnini were also found during an examination of 176 dogs.)

Irons, J. V., R. B. Eads & J. E. Peavy. 1957. Q fever in Texas. Texas Reports on Biology and Medicine, 15, 896-903. (Failure to find Coxiella burneti in 15 species of ticks including many pools of O. megnini.)

Ivens, V. R., Mark, D. L. & Levine, N. D. (1978) Principal parasites of domestic animals in the United States. Biological and diagnostic information. Urbana-Champaign, Colleges of Agriculture and Veterinary Medicine, University of Illinois, Special Publication 52. vi + 270. (*O. megnini* host parasite list - cats, cattle, dogs, horses, sheep, swine; found deep in the ears of cattle and horses; life history.)

Jack, R. W. (1928) Ticks infesting domestic animals in Southern Rhodesia. *Rhodesia Agricultural Journal, 25*, 537-556. (*O. megnini*, pp. 552-553, pl. II, figs. 1, 1a, 2-5. Discussion but the species is not present in Northern Rhodesia.)


Jack, R. W. (1936) Division of Entomology, Annual Report for the year 1936. *Rhodesia Agricultural Journal, 34*, 570-592. (*O. megnini* was found on a native horse in one locality, and on a pony imported from South Africa.)


Jagannath, M. S., Alwar, V. S. & Lalitha, C. M. (1973) Ixodid ticks of domestic stock in Tamil Nadu. *Indian Journal of Animal Science, 43*, 119-124. (Despite the title, this article includes a list of all tick species found in India, including *O. megnini*. They incorrectly list Cooley and Kohls as the authors of the generic name *Otobius*.)


Jara, F. de la. (1972) Algunas notas sobre garrapatas del ganado bovino en México (con claves para identificación de generos y especies) y su combate con Supona®. *Ciencias Veterinarias México, 16*, 19-62; (2), 131-153. (Distribution and hosts for *O. megnini* in Mexico, and figure 12b of a nymph of *O. megnini* taken from Pratt and Littig, 1962.)


Jellison, W. L., Bell, E. J., Huebner, R. J., Parker, R. R. & Welsh, H. H. (1948) Q fever studies in southern California. IV. Occurrence of *Coxiella burneti* in the spinose ear tick, *Otobius megnini*. *Public Health Reports, 63*, 1483-1489. (Partially engorged and engorged nymphs of *O. megnini* were collected from cows and calves in Los Angeles County, and tested at the Rocky Mountain Laboratory, Denver, Colorado.)
Mountain Laboratory. A total of 2,954 specimens were tested in 246 lots of 1-25 ticks each. Ten of the 246 lots tested positive for *Coxiella burnetii* infection as determined by the complement fixation test.)

**References:**

Jellison, W. L., Ormsbee, R., Beck, M. D., Huebner, R. J., Parker, R. R. & Bell, E. J. (1948) *Q* fever studies in Southern California. V. Natural infection in a dairy cow. *Public Health Reports*, 63, 1611-1618 (Following the reference section is a paragraph indicating that this is the third in a series of 5 *Q* fever studies. Already published in vol. 63 are: I. recovery of *Rickettsia burnetii* from raw milk; IV. The occurrence of *Coxiella burnetii* in the spinose ear tick, *Otobius megnini*. Yet to be published are parts II and III.)

Jenkins, D. W. (1964) Pathogens, parasites and predators of medically important arthropods. *Bulletin of the World Health Organization*, 30 (Supplement), 1-150. (The ant species, *Monomorium minimum* and *Pogonomyrmex barbatus molefaciens* are predators of *O. megnini*. These data are abstracted from Parish, 1949.)


Johnson, D. E. (1966) Ticks of Dugway Proving Ground and vicinity and their host associations. *Utah Academy of Sciences, Arts and Letters*, 43, 49-66. (Collected only second stage nymphs of *O. megnini* from the ground around watering troughs, and from cattle, horses, *Sylvilagus audubonii*, and *Eremophila alpestris*, in March through June, August and October.)


Joseph, S. A. (1982) Studies on the ecology, zoophilic and anthropophilic habits of the argasid ticks of Tamil Nadu. *Cheiron*, 11, 266-269. (*O. megnini* was recovered in large numbers from the ears of horses brought from farms in northern India for auction at the Madras Race Club. The author also found this tick in the ear of a woman who was in the habit of basking in the sun on the lawn very near a sheep shed at the Sheep Breeding Research Station, Sandynallah.)

Joyce, C. E. (1971) Tick distribution and disease potential in the Pacific area. *Proceedings CINC-PAC Preventative Medical Conference, Camp H. M. Smith, Oahu, Hawaii*, 18-22 Jan., 101-113. (Although present in Hawaii, an *O. megnini* nymph was found in the ear of a dog arriving from Texas via Los Angeles, and 3 nymphs from the ear of a cat.)

1988. This is the first record of *O. megnini* from Korea.


King, H. H. (1911) Report of the Entomological Section of the Wellcome Tropical Research Laboratories. In, *Fourth Report of the Wellcome Tropical Research Laboratories at the Gordon Memorial College, Khartoum. Volume B: General Science*. pp. 127-130. (Key to Sudanese tick species including *O. megnini*, p. 129. This entry has led several authors to conclude that *O. megnini* is a resident tick species in Sudan. It is not.)


Kingston, J. S. (1936) Spinose ear tick in India. *Journal of the Royal Army Veterinary Corps*, 7, 142-143. (First record of *O. megnini* from India. The horse was said to have been introduced from Australia. However, the spinose ear tick is not found in Australia.)

Klein, L. (1927) Ear bush ticks as a human parasite (Letter to the editor.) *Journal of the Medical Association of South Africa*, 1, 24. (Tick in the ear is a very common nuisance in these parts. The following treatment is effective. 1. Where an oily home-remedy has been used, first swab the ear with a whisp of cotton-wool. 2. Fill the ear with pure dioxygen, and wait 10 to 15 minutes. The tick either dies or loosens its hold. 3. Lastly, syringe the ear with warmed water, and the offender will come to light.)


Knipling, E. F. (1950) Insecticides for livestock pest control. Lindane and toxaphene are recommended as sprays on livestock other than dairy animals - repeated applications found non-toxic. *Soap and Sanitary Chemistry*, 26, 130-131, 133, 135, 155, 157. (Toxaphene, chlordane and lindane (containing at least 99% gamma BHC) are effective against most important ticks affecting livestock, including *Amblyomma americanum*, *A. maculatum*, *Dermacentor albipictus*, *Boophilus annulatus* and *O. megnini*.)


Knowlton, G. F. & Binns, W. (1954) Spinose ear tick control. *Utah State Agricultural College Extension Circular*, 203, 1-2. (The spinose ear tick requires direct ear treatment to secure effective control. One-half ounce per ear of lindane or chlordane is recommended in the proper formulation.)


Koshy, T. J., Achuthan, H. N., Rajavelu, G. & Lalitha, C. M. (1979) A survey of the tick fauna of Tamil Nadu. *Cheiron*, 8, 199-205. (*O. megnini* was collected on sheep from the Nilgris District of Tamil Nadu.)

Koshy, T. J., Rajavelu, G., & Lalitha, C. M. (1979) Studies on the life cycle of *Otobius megnini* (Dugès, 1883). *Cheiron*, 8, 52-56. (In Madras, the life cycle of *O. megnini* varied from 69-98 days.)

Koshy, T. J., Rajavelu, G. & Lalitha, C. M. (1981) Life cycle patterns in argasid ticks. *Cheiron*, 10, 175-178. (*O. megnini* occurs at higher elevations of Tamil Nadu and is said to have only one nymphal stage.)


Krull, W. H. (1969) *Notes in veterinary parasitology*. Lawrence, Kansas, University of Kansas Press, ix + 599 pp. (*O. megnini*, pp. 434-437, distribution, life cycle, control. An incorrect statement that the jack rabbit is a good and important host. This statement refers to *O. lagophilus*.)

Labruna, M. B., Leire, R. C. & de Oliveira, P. R. (1997) Study of the weight of eggs from 6 ixodid species from Brazil. *Memórias do Instituto Oswaldo Cruz*, 92, 205-207. (The subfamily Otobionae is represented in Brazil by *Otobius megnini*.)

Lahille, F. (1915) Nota sobre los argásidos chilenos. *Anales de Zoológia Aplicada*, 2, 5-11. (The nymphal stage of *O. megnini* has a spiny tegument, at least on the anterior portion of the body.)


Lahille, F. (1928) Nota sobre la garrapata espinosa *Ornithodoros megnini* (A. Dugès) Neumann. 4. *Reunión de la Sociedad Argentina de Patología Regional del Norte, Santiago del Estero*, May 7-9, 1928, pp. 660-664. ("Ornithodoros" megnini is the only species in this genus known from Argentina, although *O. talaje* has recently been found in Uruguay and is likely to be introduced.)


Lancaster, J. L., Jr. (1984) Ear tags provide spinose ear tick control. *Arkansas Farm Research*, 33, 8. (A brief history of how *O. megnini* was imported into Arkansas from Texas in the 1950's, a list of counties infested, and control on cattle using ear tags with a combination of Amitraz and Permethrin.)


Lane, R. S., Miller, S. E., & Collins, P. W. (1982) Ticks (Acari: Argasidae and Ixodidae) from the California Channel Islands. *Pan-Pacific Entomologist*, 58, 96-104. (10 nymphs of *O. megnini* collected on one of 2 *Cervus canadensis*, Santa Rosa Island. First record of this tick from Santa Rosa.)

Lapage, G. (1956) *Veterinary Parasitology*. Edinburgh, Oliver and Boyd, 964 pp. (*O. megnini* mentioned, p. 626; life history and effects on the host, pp. 671-672.)


Leeson, H. S. (1953) Some notes on the recorded distribution of Old World species of *Ornithodoros* (Acarina). *Bulletin of Entomological Research*, 44, 517-526. (*O. megnini* recorded from the Belgian Congo (Democratic Republic of Congo), the Indian subcontinent, Northern Rhodesia (Zambia), Southern Rhodesia (Zimbabwe), and Cape, Natal and Transvaal Provinces of South Africa.)
Leontev, I. F. (1949) Starvation of ticks. *Priroda, Moskva*, 38, 51-52. (*O. megnini* briefly mentioned along with other “*Ornithodoros*” species such as *O. hermsi*, *O. papillipes* and *O. verrocusus*. In Russian.)

Lewis, II, T. (1989) Ticks and associated diseases. *Pet Focus*, 1, 21-23. ("*Otobius megnini* (the spine ear tick) is the only soft tick of importance in North America, and is found mostly in the southwestern United States.")


Lloyd, J. E. (Date?) Insect and related pests of livestock in Wyoming. *University of Wyoming Cooperative Extension Service Publication* MP23, iv + 12 pp. (*O. megnini* is firmly established in Wyoming, and may be abundant in their hosts ears during the summer. Wounds may become infected with bacteria, giving rise to a condition known as “ear canker”.)


Lokesh, Y. V. & Jagannath, M. E. (1983) A study on the sugar content of *Otobius megnini* Duges [sic] (Acri [sic]: Metastigmata). *Indian Journal of Acarology*, 7, 70-72. (Using paper chromatography, homogenates of eggs and adults of *O. megnini* were found to contain glucose and traces of fructose.)


Long, P. (1992) External parasites in alpacas. *Alpacas*, summer 1992, 43-44. (*O. megnini* can affect llamas and alpacas. They live in the ear canal and ivermectin is reported to be an effective treatment. However, see Craig & Kunde, 1981 and Drummond, 1985.)


Loomis, E. C. (1968) Tick paralysis in California livestock. *American Journal of Veterinary Research*, 29, 1089-1093. (Other paralysis-causing ticks in California, but thus far not implicated in livestock paralysis, are *Argas persicus* and *O. megnini*.)


Loubser, J. N. W. (1927) Ueber Ohrzecken (Ornithodorus megnini) bei Menschen in Süd-Afrika. *Archiv für Schiffs-und Tropenhigiene,* 31, 45. (Several cases were seen of O. megnini in the ears of man in 1923-1924. Patients only noticed the presence of ticks when they pressed on the tympanic membrane. Removal was by douching with tepid water.)

Lucker, J. T. & Foster, A. O. (1957) Parasites and parasitic diseases of sheep. *United States Department of Agriculture Farmers' Bulletin,* 1330, 1-51 (O. megnini, pp. 8-9, fig. 6, incorrect information that there is only one nymphal stage. This is a revision of an earlier edition by Hall, Dickmans & Wright.)


MacLeod, J., Colbo, M. H. & Bek-Pedersen, S. (1970) Occurrence of the spinose ear-tick in Zambia. *Bulletin of Epizootic Diseases of Africa,* 18, 355-358. (O. megnini found in the ears of horses, cattle and sheep in the Mazabuka district, Southern Province and on a cat in the Northern Province. It is stated that this is the first record of O. megnini from Zambia - but see Morris, 1933.)

MacNay, C. G. (1952) Summary of the more important insect infestations and occurrences in Canada in 1951. *Annual Report of the Entomological Society of Ontario,* 82, 91-115. (O. megnini was present in about 50% of the deer in the Kamloops, B. C. area.)


MacNay, C. G. (1956) Summary of important insect infestations, occurrences and damage in Canada in 1955. *Annual Report of the Entomological Society of Ontario,* 86, 104-127. (In the spring of 1955, 5 cattle deaths in the Shuswap Lake area were attributed to infestation by O. megnini.)

MacNay, C. G. (1956) Insects affecting man and domestic animals. *Canadian Insect Pest Review,* 34, 286-287. (A calf infested with 50 nymphs of O. megnini was found at Kamloops on November 4, 1955. The animal died on June 25, 1956 and two-thirds of the ticks survived in the calfs ear for 225 days.)

MacNay, C. G. (1957) Insects attacking man and other mammals. *Annual Report of the Entomological Society of Ontario,* 87, 99-100. (O. megnini was generally present in native ungulates and in some herds of cattle in the area of British Columbia south of parallel 52 and east of meridian 121. Infestation by this tick killed 6 cattle and was probably the cause of death in other cases reported.)
MacNay, C. G. (1960) Summary of important insect infestations, occurrences and damage in agricultural areas of Canada in 1959. *Proceedings of the Entomological Society of Ontario*, 90, 59-73. (*O. megnini* caused the death of a yearling heifer and may have been associated with previous casualties where symptoms were similar. This species is common on mule deer and elk.)


Manfredi, M. T. (1999) Infestazione da *Otobius megnini* in cani importati. *Praxis Veterinaria*, 20, 15-17. (*O. megnini* was found in the ear canals of dogs imported into Italy from South Africa.)


Marmion, B. P. (1951) "Q" fever. *Journal of the Royal Sanitary Institute*, 71, 97-102. (The "Q" fever organism has been isolated from *Haemaphysalis humerosa* in Australia, *Dermacentor andersoni*, *Rhipicephalus sanguineus*, *Amblyomma americanum* and *O. megnini* in the U.S.A., and from *Hyalomma savignyi* and *H. excavatum* in Morocco and Spain.)


Martin, J. (1925) Ear ticks (Letter to the editor). *The Farmers Weekly Bloemfontein*, 30, 1382-1383. (Letter of complaint that *O. megnini* was introduced into his goat herd in the Port Elizabeth area, but the government is unaware of its presence.)


Martini, E. (1941) *Lehrbuch der medizinischen Entomologie*, 1st ed. Jena, Gustav Fischer. xvi + 585 pp. (*O. megnini*, p. 257. larva and nymph live in the ears of cattle; p. 262, found in Africa and America; fig. 179 on p. 261 is supposed to be a nymph, but is an adult.)

Martini, E. (1952) Lehrbuch der medizinischen Entomologie, 4th ed. Jena, Gustav Fischer. xvi + 694 pp. (O. megnini, pp. 283, 288; India now added to the list of countries where the spinose ear tick is found.)

Matthews, B. R. (1989) Otobius megnini (spinose ear tick) in a dog. Canadian Veterinary Journal, 30, 180. (Two nymphs were removed from the horizontal canal of one of the dog's ears.)

Mazotti, L. (1942) Los Ornithodoros de México y su relación con la fiebre recurrente. Revista del Instituto de Salubridad y Enfermedades Tropicales, 3, 47-52. (Among the argasid ticks of no medical importance in Mexico are Ornithodoros dyeri, Antricola coprophilus and O. megnini.)


McDaniel, B. (1979) How to know the mites and ticks. Dubuque, Iowa, Wm. Brown Company. 335 pp. (O. megnini, p. 99, fig 173. He states incorrectly that O. megnini is a two-host tick.)

McDuffie, W. C. (1960) Current status of insecticide resistance in livestock pests. Miscellaneous Publications of the Entomological Society of America, 2, 49-54. (The ear tick O. megnini is fairly widespread in the U.S.A. and may be troublesome the year around.)

McIntosh, A. & McDuffie, W. C. (1956) Ticks that affect domestic animals and poultry. Yearbook of Agriculture, United States Department of Agriculture. Yearbook separate, No. 2677, 157-166. (Discussion of the life cycle and feeding habits of O. megnini. It is estimated that in the United States the spinose ear tick is responsible for an annual loss of 1.3 million dollars in the sheep industry alone.)

Medrano, C. A. & Suárez, V. H. (1983) La garrapata espinosa de la oreja, Otobius megnini (Dugès, 1883) en la provincia de La Pampa. Boletín de la Divulgación Técnica Estación Experimental Regional Agropecuaria Anguil, (La Pampa), (23), 1-15. (Figure, p. 6, incorrectly shows 3 nymphal stages.)

Mégnin, P. (1883) Les garrapatas du Mexique. Comptes-Rendu des Séances de la Société de Biologie, 35, 7s, 5, 489-491. (See introductory remarks.)


Mégnin, P. (1892) Les acarines parasites. Encyclopédie Scientifique des Aide-Mémoire, 182 pp. (Three tick species in Mexico were studied including O. megnini, p. 67.)

Meleney, W. P. (1975) Arthropod parasites of the collared peccary, Tayassu tajacu (Artiodactyla: Tayassuidae), from New Mexico. Journal of Parasitology, 61, 530-534. (First report of O. megnini from this host. Two nymphal O. megnini were also recovered from the ears of a recently skinned bobcat, Lynx rufus.)

Meleney, W. P. (1982) Control of psoroptic scabies on calves with ivermectin. American Journal of Veterinary Research, 43, 329-331. (Discussed are the mite, Psoroptes ovis, the biting louse, Bovicola bovis, and the tick, O. megnini.)


Méndez, E. (1999) Insectos y otros arthrópodos de importancia médica y veterinaria. Panamá, República de Panamá Edición Limitada. vii + 341 pp. (O. megnini, p. 244, causes otoacariasis and is found in the U.S.A., South America, Africa and India.)

Merchant, S. R. (1990) Zoonotic diseases with cutaneous manifestations in food animals - Part I. *Compendium on Continuing Education for the Practicing Veterinarian*, 12, 1489-1497, 1519. (*O. megnini* can cause ear ulcerations which can predispose to secondary bacterial infections as well as screwworm invasion.)


Metcalf, C. L. & Flint, W. P. (1939) *Destructive and useful insects. Their habits and control*, 2nd ed. New York, McGraw Hill Book Company, Inc. xvi + 981 pp. (*O. megnini*, p. 838, fig. 552, prevalent in the semiarid sections of southwestern United States; these ticks live and feed in ears of their hosts from 1-7 months.)


Miranpuri, G. S. (1979) *Tick taxonomy in India (Ixodoidea: Acarina)*. A review including notes on their biology, ecology, geographical distribution, host-relationship, ticks and tick-borne diseases and keys for species identification. Izatnagar, Uttar Pradesh, Division of Parasitology, Indian Veterinary Institute. 171 pp. (*O. megnini*, p. 97, found on a horse, Ahmednagar, Maharashtra.)

Miranpuri, G. S. & Gill, H. S. (1983) *Ticks of India*. Edinburgh, Lindsay & Macleod Ltd. 125 pp., 22 pl. (*O. megnini*, p. 64, from Central Provinces and Uttar Pradesh.)


Mock, D. E. & Bertholf, J. K. (1985) *Kansas State University Cooperative Extension Service Ag Facts*, AF-125 (Revised), unpaginated but 6 pp. (*O. megnini* found frequently in the ears of cattle shipped into Kansas from southern states.)


Mock, D. E. & Kuhlman, D. K. (1993) Animal pest control. *Kansas State University Cooperative Extension Service*, S-13 (Revised), 1-48. (Figure of *O. megnini*, p. 20; spinose ear ticks and Gulf Coast ticks, p. 37, occasionally infest horses ears and require insecticidal ear treatment.)

Mohler, J. R. (1905) Texas fever (otherwise known as tick fever, splenetic fever, or southern cattle fever), with methods for its prevention. *Bulletin of the United States Bureau of Animal Industry* 78, 1-48. (*O. megnini*, p. 15, pl. 2, figs. 2 and 2a. The shape of this tick is similar to that of the body of a violin. It is found in the ears of cattle, horses, mules, asses, and other animals in the South and West.)

Mohler, J. R. (1906) Texas or tick fever and its prevention. *United States Department of Agriculture Farmers' Bulletin*, No. 258, 1-45. (*O. megnini*, pp. 16-17, fig. 4, numbers 6, 6a.)


Mohler, J. R. (1930) Tick fever. *United States Department of Agriculture Farmers' Bulletin*, No. 1625, 1-29. (*O. megnini*, p. 11, fig. 4, numbers 6, 6a, 6b.)


Moriello, K. A. (1987) Common ectoparasites of the dog. Part 1: Fleas and ticks. *Canine Practice*, 14, 6-18. (Problems with *O. megnini* were once limited to dogs in the southern United States, but the mobile lifestyle of clients and their dogs increases the chances of finding this tick species anywhere.)

Morris, J. P. A. (1933) Part II. Disease control. Annual report *Department of Animal Health Northern Rhodesia for 1932*, 14-27. (First record of *O. megnini*, p. 23, for Northern Rhodesia (Zambia). It was observed on imported cattle.)

Mucherl, L. M. (1952) Investigación de la enfermedad llamada meningo-encefalitis en el ganado de la zona de Calama e interior fronterizo, identificada como otoacaríasis a *Ornithodoros megnini* (Duges, [sic] 1883). *Boletín de Informaciones Parasitarias Chilenas*, 7, 8-9. (The author concludes that the disease is produced by nymphs and larvae of *O. megnini* in the external ear, causing general nervous upset of centripetal origin with an esclamptic syndrome.)


Munro, J. A. (1960) A special survey of Bolivian insects. *United States Department of Agriculture Cooperative Economic Insect Report*, 10, 1061-1072. (*O. megnini* was found on a burro at Tarabuco, Bolivia.)


Neilson, C. L. & Rich, G. B. (1973) *Live-stock insect control*. Entomology Branch, Ministry of Agriculture, Victoria, British Columbia, Canada, 10 pp. (The spinose ear tick is only found in interior British Columbia. For control ½ oz. of 25% lindane per gallon of water. Pour 2 tablespoons deep into each ear.)


Neumann, L. G. (1908) Notes sur les ixodidés. *VI. Archives de Parasitologie*, 12, 5-27. (*O. megnini* mentioned in a key on p. 22.)


Nuttall, G. H. F. (1899) On the role of insects, arachnids and myriapods, as carriers in the spread of bacterial and parasitic diseases of man and animals. A critical and historical study. *Johns Hopkins Hospital Reports*, 8, 1-154. (Mégnin, p. 48, kept some specimens of *O. megnini* alive without food for 2 years.)

Nuttall, G. H. F. (1899) On the role of insects, arachnids and myriapods, as carriers in the spread of bacterial and parasitic diseases of man and animals. A critical and historical study. *Johns Hopkins Hospital Reports*, 8, 1-154. (Mégnin, p. 48, kept some specimens of *O. megnini* alive without food for 2 years.)


Nuttall, G. H. F. (1911) Notes on ticks. I. *Parasitology*, 4, 175-182. (*O. megnini* now placed as an aberrant form of Nuttall's group 2.)
Nuttall, G. H. F. (1914) "Tick paralysis" in man and animals. Further published records with comments. *Parasitology*, 7, 95-104. (Dr. I. U. Temple, of Pendleton, Oregon, sent F. C. Bishopp and W. D. Hunter 3 ticks from eastern Oregon that proved to be *Dermacentor albipictus*, *D. venustus* and *Otobius megnini*. *O. megnini* has not been found this far north before.)


Nuttall, G. H. F., Warburton, C., Cooper, W. F. & Robinson, L. E. (1911) *Ticks: A monograph of the Ixodoidea. Part II. Ixodidae* by Nuttall and Warburton. Cambridge at the University Press. xix + 105-348. (A reprint of Nuttall's (1911) article on the adaptations of ticks to the habits of their hosts is presented as appendix II.)


Oliver, J. H., Jr. (1974) Symposium on reproduction of arthropods of medical and veterinary importance. IV. Reproduction in ticks (Ixodoidea). *Journal of Medical Entomology*, 11, 26-34. (Some spermatocytes of engorged nymphal *O. megnini* undergo meiosis and almost certainly continue to develop into spermatsids.)

Oliver, J. H., Jr. (1977) Cytogenetics of mites and ticks. *Annual Review of Entomology*, 22, 407-429. (No published data on *Otobius* chromosomes exist, but unpublished research of Oliver and Osburn indicates that both *O. megnini* and *O. lagophilus* males consist of 2n = 20. Presumably males possess XY sex chromosomes and females XX chromosomes. See Oliver and Osburn below.)


first stage nymphs and 5 second stage nymphs of O. megnini.)
Parish, H. E. (1942) Factors predisposing animals to screwworm infestation in Texas. *Journal of Economic Entomology*, 35, 899-903. (*O. megnini* is responsible for over 7% of *Cochliomyia hominivorax* infestations in lambs and over 3% in sheep and cattle.)
Parish, H. E. (1949) Recent studies on life history and habits of the ear tick. *Journal of Economic Entomology*, 42, 416-419. (Studies on *O. megnini* were conducted in Texas. Eggs laid in February required 50 days to hatch. Larvae engorged in 5-10 days in the ears of cattle; molted to nymphs 1-5 weeks later. Nymphs engorged for 2 or more months, dropped to the ground and molted. Adults did not feed, and one mating produced an average of 1444 eggs in 5.8 egg masses.)
Parr, V. V. (1925) Beef-cattle production in the range area. *United States Department of Agriculture Farmers Bulletin*, No. 1395, 1-43. (*O. megnini*, pp. 42-43, is prevalent in the southern portion of the Great Plains region and very generally in the arid sections of the intermountain region. An infested animal usually shakes its head, holds it to one side or the other, and rubs it as if the ears itched. The ticks may be beyond detection by sight, in which case a smooth wire bent into a half-inch circle, with an extension of from 6 to 8 inches as a handle, may be inserted into the ear and used to dislodge some of the ticks. Dipping is not effective, but a small amount of a mixture of 2 parts, by volume, of pine tar and one part of cottonseed oil slightly heated, if necessary to mix thoroughly, poured into the ear is very effective.)
Parr, V. V. (1933) Beef-cattle production in the range area. *United States Department of Agriculture Farmers Bulletin*, No. 1395 (revised), 1-43. (*O. megnini*, pp. 42-43, same as immediately above.)
Pavri, K. M., Anderson, C. R. & Singh, K. R. P. (1964) An outbreak of rabies in horses near Poona, India. *Current Science*, 33, 329-330. (The only tick species found on these horses was *O. megnini*, and no virus was isolated from pools of this tick species.)
(eds.) *The Worldwide Furbearer Conference Proceedings*, (Frostburg, August 1980), pp. 760-845. (Table 3, *O. megnini* recorded on coyote. Data from Bishopp & Trembley (1945) publication.)


Pfadt, R. E., Lloyd, J. E. & Spackman, E. W. (1983?) Control of insect and related pests of sheep. *University of Wyoming Agricultural Experiment Station Bulletin*, 514R, 1-15. (*O. megnini*, p. 5, fig. 6. This bulletin is undated, but from internal evidence it appears to have been printed in 1983.)

Philip, C. B. (1953) *Tick talk*. *Scientific Monthly*, 76, 77-84. (*O. megnini* briefly mentioned as the spinose ear tick, p. 80, and as having a well-armed hypostome in the nymphal stages but an unarmed hypostome as adults.)

Philip, C. B. & Burgdorfer, W. (1961) Arthropod vectors as reservoirs of microbial disease agents. In, Steinhaus, E. A. and Smith, R. F. (eds.) *Annual Review of Entomology*. Palo Alto, California, Annual Reviews. pp. 391-412. (*O. megnini* infected with *Coxiella burneti* have been collected from healthy cattle. The citation given for this information was Irons et al. (1952). Philip & Burgdorfer were incorrect; the cattle were positive for *Coxiella burneti* but the *O. megnini* feeding on them were negative.)


Pinto, C. (1930) *Arthrópodes parasitos e transmissores de doenças*. Tomo I. Rio de Janeiro, Pimenta de Mello & C. xvi + 395. (*O. megnini*, p. 54, fig. 20, found in North America, Mexico, Argentina, Venezuela, Peru and Brazil. This is the first record of *O. megnini* from Brazil.)

Ponte, E. del. (1958) *Manual de entomologia médica y veterinaria argentinas*. Buenos Aires, Ediciones Librería del Colegio. 349 pp. (*O. megnini*, p. 276, group 3; p. 279, brief morphology; p. 280, fig. 203, 204 (after Boero, 1944), Table 20.)

Porter, C. E. (1917) *Notas de Acarologia*. 1. Un caso de otoacariasis en le norte de Chile. *Anales de Zoología Aplicada*, 4, 30. (Porter reports *Ornithodoros talaje* in the ear of a woman who milked cows in Vallenar, Chile. The tick is obviously *Otobius megnini*.)


Pospelova-shtrom, M. V. (1969) On the system of classification of ticks of the family Argasidae *Can.*, 1890. *Acarologia*, 11, 1-22. (*O. megnini* females, without feeding, lay eggs under the bark of trees against which vagrant ungulates come to rub themselves and so are attacked by tick larvae.)


Price, M. A., Newton, W. H. & Hamman, P. J. (1967) Insect, mite and tick parasites of Texas horses. *Texas A & M University Agricultural Extension Service MP-833*, 1-8. (The duration of the 2 nymphal stages of *O. megnini* can be as short as 3 weeks or as long as 7 months. Females begin to lay eggs within 2-6 weeks after mating, and deposit 800-1,000 eggs.)

Price, M. A., Newton, W. H. & Hamman, P. J. (1967) External parasites of Texas sheep and goats. *Texas Agricultural Extension Service*, MP-834, 1-11. (The duration of the 2 nymphal stages of *O. megnini* in an animal's ear can be as short as 3 weeks or as long as 7 months. A female deposits 800 to 1000 eggs.)

Quintero, M. T. & Acevedo, A. (1987) *Frecuencia de Psoroptes caprae, Dermacentor variabilis y Otobius megnini* en conducto auditivo de caprinos sacrificados en el rastro municipal de Ciudad Nezahualcoyotl, Estado de Mexico. *Veterinaria*, 18, 119-121. (*Psoroptes caprae* was found in 18.2% of the ears of 909 slaughtered goats. In some samples, the tick species *Dermacentor variabilis* and *O. megnini* were also found.)

41-58 (Larval *O. megnini*, p. 51, climb to a vantage point that is approximately the height of a cow's ears when the animal is grazing.)


Raja, E. E., Joseph, S. A. & Lalitha, C. M. (1986) Vector potential in relation to incidence of bovine theileriosis in Tamil Nadu. *Cheiron*, 15, 110-112. (The argasid tick species collected from cattle with suspected cases of theileriosis were *O. megnini* and *Ornithodoros savignyi*.)

Rajeswari, Y. B., Jagannath, M. S. & Abdul Rahman, S. (1987) Field trials with propetamphos for the control of ixodid ticks. *University of Agricultural Sciences Bangalore Current Research*, 16, 1, 13-14. (Horses infested with *O. megnini* achieved 100% control after 48 hours with 0.05% Blotic (propetamphos), and no reinfection occurred over the following 8 weeks.)


Ransom, B. H. (1908) *Yearbook, United States Department of Agriculture, 1907*, Washington, D.C., 798 pp. (*O. megnini*, p. 552, has been found in portions of 3 parishes in northern Louisiana. The infestation probably originated with the importation of horses from west Texas.)


Ransom, B. H. (1909) *Yearbook, United States Department of Agriculture, 1908*, Washington, D.C., 822 pp. (*O. megnini*, p. 580, was present in usual numbers and some attacks upon humans came to notice.)

Ransom, B. H. (1916) The animal parasites of cattle. In, *U.S. Department of Agriculture Bureau of Animal Industry Special Report on Diseases of Cattle*. pp. 510-536. (*O. megnini*, p. 523, larvae may live for 80 days without a host. Ear ticks are difficult to kill because of their protected location. This publication first appeared in 1892 and again in 1896, 1904, 1908 and 1912. We do not know if *O. megnini* was cited in the other editions.)

Rapp, W. F. (1958) Tick problems in the Great Plains states. *Proceedings of the 13th Annual Meeting North Central Branch Entomological Society of America*, 13, 47-49. (*O. megnini* is a pest of certain herds of cattle in Kansas, is established in Wyoming, and is increasing in numbers in southwestern Nebraska.)


Reeves, W. C. & Hammon, W. McD. (1962) Epidemiology of the arthropod-borne viral encephalit-
ides in Kern County, California 1943-1952. University of California Publications in Public Health, 4, 1-257. (Table 3-1, O. megnini listed as one of the blood-sucking arthropods of Kern County.)


Rich, G. B. & Gregson, J. D. (1968) The first discovery of free-living larvae of the ear tick, Otobius megnini (Duges) [sic], in British Columbia. Journal of the Entomological Society of British Columbia, 65, 22-23. (Larvae dropping into the hair of humans from the roof of a cave where mountain sheep shelter and rest.)


Riley, W. A. & Johannsen, O. A. (1932) Medical entomology; a survey of insects and allied forms which affect the health of man and animals. New York, McGraw Hill. xi + 476 pp. (O. megnini, pp. 72-73, fig. 34 after Stiles, fig. 35 after Nuttall & Warburton.)

Riley, W. A. & Johannsen, O. A. (1938) Medical entomology; a survey of insects and allied forms which affect the health of man and animals, 2nd ed. New York, McGraw Hill. xiii + 483 pp. (O. megnini found as far north as Iowa, Nevada, Oregon, and even Alberta. The generic name Otobius is misspelled as either Otiobius or Otiobus on pp. 70, 72 and 73.)


Roberts, F. S. H. (1952) Insects affecting livestock. Australian Agricultural and Livestock Series. Sydney, Angus and Robertson. vi + 267 pp. (O. megnini, pp. 201-202, adults are not parasitic and not found on animals. He gives the distribution as South Africa, the United States, Mexico, the Argentine, and India.)

Roberts, I. H., Hanosh, G. J. & Apodaca, S. A. (1964) Observations on the incidence of chorioptic acarasis of sheep in the United States. American Journal of Veterinary Research, 25, 478-482. (In a survey for Choriotes bovis of sheep in 8 states, O. megnini was found on 5% of the sheep on 2 ranches in Quemado and Vander Wagen, New Mexico.)


Rodriguez, P. H. (1977) A survey of ectoparasites of hares and rabbits in Grant County, New Mexico. Texas Journal of Science, 28, 358. (Two adults and a nymph of O. megnini reported from 2 cottontail rabbits. Adult Otobius are not likely to be found on a host, and these may well be O. lagophilus rather than O. megnini.)


Roveda, R. J. (1954) *Ixodoidea*. Contribucion biológica. *Revista de Medicina Veterinaria*, 36, 105-112, 115-119. (Larvae of *O. megnini* last 60 days in summer and 120 days in winter in the laboratory. Nymphs molt to adults in 10-20 days, and adults can live in the laboratory for 20 months.)


Rude, C. S. & Parish, H. E. (1946) Control of the ear tick. *Bureau of Entomology and Plant Quarantine, United States Department of Agriculture*, Leaflet E-695, 1-4. (Applying stock 1029 to the ears with a one-inch paint brush provides effective control of *O. megnini*.)

Rude, C. S. & Smith, C. L. (1944) DDT for control of gulf coast and spinose ear ticks. *Journal of Economic Entomology*, 37, 132. (A non-drying adhesive containing 5% DDT was applied inside the ears of 113 cattle at Manard, Texas. There was a high percentage of *O. megnini* killed and a high degree of protection from reinfection, although no figures are given.)


Saliba, E. K., Sweatman, G. K. & Kawar, N. S. (1971) Effect of ronnel on the respiration rate of *Ornithodoros savignyi* ticks at different temperatures after topical application or oral ingestion. *Journal of Medical Entomology*, 8, 73-83. (Brief mention that Drummond et al. (1967) obtained excellent control of *O. megnini* with either a 0.75% spray or a 5% dust of ronnel.)


Samish, M. & Rehacek, J. (1999) Pathogens and predators of ticks and their potential in biological control. *Annual Review of Entomology*, 44, 159-182. (Ants are known to prey on various tick genera, and are thought to be killers of *Argas miniatius*, *Boophilus annulatus* and *B. microplus*, *Ornithodoros moubata* (incorrectly placed in the genus *Otobius*), and *O. megnini*.)

Sanchez, D. J. (1887) Datos para la zoología médica Mexicana. *Gaceta Médica de México*, 22, 97-111. (*O. megnini*, p. 107, sometimes absorbs blood in such amounts that its volume increases extraordinarily.)


Santos Dias, J. A. T. (1955) Contribuição para o conhecimento da fauna Ixodológica do Sudoeste Africano. *Anais do Instituto de Medicina Tropical*, 12, 75-100. (*O. megnini* was not found in Santos Dias's examination of Dr. Fritz Zumpt's tick collections from Southwest Africa (Namibia). He does list it from Cape, Orange Free State, Natal and Transvaal Provinces of
South Africa.

Savory, T. (1964) *Arachnida*. London and New York, Academic Press. viii + 291 pp. (Ticks such as *O. megnini*, p. 239, attach in the ear where the host cannot scratch or rub them off.)


Schulze, P. (1942) Die Gestaltung des Mitteldarmes bei den Zecken und die Einrichtungen für die Körperdehrung bei der Blutaufnahme (nebst Beiträgen zur Lebensgeschichte der Ixodoidea). *Zeitschrift für Morphologie und Ökologie der Tiere*, 39, 320-368. (p. 350, mention that adults of *O. megnini* do not feed and that the nymphal feeding must provide the material for molting to the adult stage and also for the production of 800 eggs by the female.)


Schwartz, B. (1947) Livestock and poultry parasite investigations. *Report of the Chief of Bureau of Animal Industry. Annual Reports of Department of Agriculture*, 1945-1946, 49-59. (Nearly 3,200 cattle were treated for the control of *O. megnini* by using (all parts by weight) benzene hexachloride (5 parts); xylol (10 parts); pure steam- distilled pine oil (85 parts). Aside from being easy to prepare and use, it is effective and leaves the ears free of debris.)
Scott, D. W. (1980) External ear disorders. Journal of the American Animal Hospital Association, 16, 426-433. (O. megnini is geographically restricted to the southwest United States and rarely parasitizes cats. He goes on to cite where the eggs are laid and that larvae will feed on blood, tissue fluids and, “the epithelial lining of the external ear canal”.)
Scott, H. G. (1967) Dog ectoparasites. Pest Control, 35, 15-18. (O. megnini is found in the arid regions of the western half of the United States. Nymphs secrete themselves in ear folds or deep in the ear canal, even against the ear drum. Sometimes ear canals are packed with ticks.)
Sen, P. (1938) A check- and host-list of Ixodoidea (ticks) occurring in India. Indian Journal of Veterinary Science and Animal Husbandry, 8, 133-147. (O. megnini reported from horses in the Central Provinces, Ahmednagar and Saugor; Jubbulpore and Trimulgherry.)
Sen, S. K. (1937) The occurrence of spinose ear tick (Ornithodorus megnini) in India. Proceedings of the 24th Indian Science Congress, (Hyderabad), pp. 394-395. (Speculation on how the tick was introduced into India; 1. with artillery mules from North America; 2. from Australia where, however, O. megnini is not known to occur (see Kingston, 1936); 3. with stock coming from South Africa where the tick was first seen in 1898.)
Sheals, J. G. (1973) Arachnida (Scorpions, spiders, ticks, etc.) In, Smith, K. G. V. (ed.) Insects and other arthropods of medical importance. London, Trustees of the British Museum (Natural History). pp. 417-472. (O. megnini, p. 449, a serious pest of cattle, inhabits the warmer areas of North and South America and in Africa and India.)

Shipley, A. E. (1914) Insects and war. IX. Ticks. British Medical Journal, Nov. 14, 850-851. (Shipley said that he assisted in identifying 2 nymphal ticks taken in Cambridge from the ear of an American visitor who had been camping in Arizona. The tick was O. megnini - see also Simpson, 1901 and Wheler, 1906.)


Silva-Goytia, R. & Elizando, A. (1952) Estudos sobre fiebre manchada en México. II. Parásitos hematofágos encontrados naturalmente infectados. Revista Medicina Mexico, 32, 278-282. (O. megnini, table 1, p. 279. There were 6 collections of this species; none were infected with the spotted fever rickettsia.)

Simms, B. T. (1946) Report of the chief of the Bureau of Animal Industry, Agricultural Research Administration, 1945. Washington, D.C., United States Department of Agriculture. v + 66 pp. (O. megnini in the ears of cattle in the Rio Grande Valley of Texas were controlled for more than 3 weeks with an emulsion of 0.25% BHC (30% gamma isomer).)

Simms, B. T. (1947) Report of the chief of the Bureau of Animal Industry, Agricultural Research Administration, 1946. Washington, D.C., United States Department of Agriculture. 84 pp. (By April 1947 nearly 3,200 cattle were treated experimentally for the control of O. megnini with a mixture of 5 parts by weight BHC, 10 parts xylene and 85 parts pure steam-distilled pine oil. It killed ticks and prevented reinestation for more than 17 but less than 24 days.)

Simpson, J. C. (1901) Case of a parasite-Argas (or Ornithodorus) megnini Dugès-in each ear. (With a note on the anatomy of the specimen by E. G. Wheler). Lancet. (4052), 1, 1197-1198. (Two nymphs in the ears of an American visitor to the United Kingdom. He had been camping in Arizona.)


Smith, H. H., Janssen, R. J., Mail, G. A. & Wood, S. A. (1969) Arbovirus activity in southern Arizona. American Journal of Tropical Medicine and Hygiene, 18, 448-454. (In a survey for arboviruses from 1963-1966, 929 Otobius megnini were collected from cattle, horses, dogs, cats, man, deer and rabbits. None were positive for viruses.)

Smith, K. W. (1937) Common ailments and first-aid treatment of livestock. New Mexico College of Agriculture and Mechanic Arts, Agricultural Extension Service Circular, 135, 1-39. (O. megnini, p. 33, is common in New Mexico on all classes of farm animals. Damage is caused by constant irritation, and poorly nourished cattle may succumb from heavy infestations.)

Smith, J. S. (1977) A survey of ticks infesting white-tailed deer in 12 southeastern states. Master of
Science Thesis, University of Georgia, 60 pp. (O. megnini (Table 1) on white-tailed deer in Montana.)

Smith & Benner. (1943) New Mexico Extension Circular, 153(revised), 34 (O. megnini reference not verified.)

Smith, R. C. & Kelly, E. G. (1937) The sixth annual insect population summary of Kansas covering the year 1936. Journal of the Kansas Entomological Society, 10, 113-132. (O. megnini was reported to be plentiful, especially in western Kansas, during the winter of 1935-1936, and again in the autumn of 1936.

Smith, R. C. & Kelly, E. G. (1944) The thirteenth or 1943 annual insect population summary of Kansas. Journal of the Kansas Entomological Society, 17, 81-103. (O. megnini occurred moderately in some cattle herds during October. For the year they were less numerous and annoying than last year, or normally.)

Snipes, B. T. (1948) Beef cattle freed of lice in one treatment control. Agricultural Chemistry, 3, 30-34, 79, 81. (Each ear of 9 cattle were infested with 10-15 O. megnini, and treated with an emulsion of piperonyl butoxide and pyrethrins. After 15 days, 8 animals were free of ticks, the other had one.)


Soundararajan, C., Kumar, R. A. & Iyue, M. (2000) Otobius megnini infestation in dogs in Nilgiris. Journal of Veterinary Parasitology, 14, 8. (The overall incidence of O. megnini was 19.2% in 52 dogs examined in Nilgiris, Tamil Nadu, India. The infested dogs were from a sheep farm and may have been infested because of close association with sheep.)

Spackman, E. & Lloyd, J. E. (1971) Control of insects on beef cattle. University of Wyoming Agricultural Extension Service Bulletin, 544, 1-16. (For the control of O. megnini, a 5% ronnel (Korlan) dust is recommended applied inside the ears of cattle with a plastic squeeze bottle.)

Spackman, E. & Lloyd, J. E. (1978) Control of insect pests of beef cattle. University of Wyoming Agricultural Extension Service Bulletin, 544R, 1-20. (For the control of O. megnini, couma phos (Co-Ral) at a 0.125% concentration spray or dip is recommended.)


Squire, F. A. (1972) Entomological problems in Bolivia. Pest Articles and News Summaries, 18, 249-268. (O. megnini, p. 262, mentioned as one of the 2 argasid ticks found in Bolivia.)

Stanton, J. C. (1958) Spinous [sic] ear tick in a mare. Southwestern Veterinarian, 11, 140-141. (A large specimen of O. megnini was found in the ear of a 13 year albino mare used as a child's pony. The tick was attached to the tympanic membrane.)

pp. (O. megnini, p. 13, table 1; p. 53.)

Stiles, C. W. (1914) Diseases caused by animal parasites (exclusive of protozoan infections). In, Osler, W. & McCrae, T. (eds.) Modern medicine its theory and practice. Vol. II. Philadelphia, Lea & Febiger. pp. 217-328. (“The spinose ear tick (Ornithodoros megnini) is an American species which enters the ears of cattle, deer, dogs, and swine, and occasionally of man, causing considerable suffering. It can best be removed by pouring some bland oil into the ear.”)

Stiles, C. W. & Hassall, A. (1901) Notes on parasites 55-57. 55: A pupa-like stage in the development of the spinose ear tick (Ornithodoros megnini) of cattle. Bureau of Animal Industry, United States Department of Agriculture, Circular No. 34, 1-2. (“The white pyriform structures are, accordingly, the transition stage from the hexapod embryo of Ornithodoros megnini to the smallest octopod form of Marxs Rhynchoptium spinosum”.)


Stiles, G. W. (1944) Isolation of the Bacillus anthracis from spinose ear ticks Ornithodoros megnini. American Journal of Veterinary Research, 5, 318-319. (Bacillus anthracis isolated from a colony of O. megnini attached to the ear of a cow that died of anthrax.)


Stoker, M. G. P. & Marmion, B. P. (1955) The spread of Q fever from animals to man. Bulletin of the World Health Organization, 13, 781-806. (Several references to O. megnini in California, but because it is a one host tick, it would be an inefficient vector unless transovarial transmission of Coxiiella burneti is proved.)


Sugimoto, M. (1936) Ticks and the role they play in the transmission of diseases. Journal of the Taihoku Society of Agriculture and Forestry, 1, 245-250. (Brief mention of the nymph of O. megnini.)

Swartzell, R. P. (1996) Preliminary results of a tick surveillance program in selected areas of San
Joaquin County. Proceedings and Papers of the 64th Annual Conference of the California Vector Control Association, 64, 116-117. (Five tick species were recorded from San Joaquin County: *Ixodes pacificus*, *Dermacentor occidentalis*, *D. variabilis*, *Rhipicephalus sanguineus* and *O. megnini*. The specific epithet was misspelled *maegnini*.)


Tagle, I. (1953) Parásitos de los animales domésticos en Chile determinados en el Instituto de Investigaciones Veterinarias. *Apartado de Agricultura Técnica*, 13, 93-108. (*O. megnini* on horses and cattle in Chile.)

Tagle, I. (1966) Parásitos de los animales domésticos en Chile. *Boletín Chileno de Parasitología*, 21, 118-123. (*O. megnini* on horses and cattle in Chile.)

Tagle, I. (1971) Ixodoidea en Chile. *Boletín Chileno de Parasitología*, 26, 46-49. (*O. megnini* frequently found on cattle and horses. Occasionally it may attack humans.)

Tarshis, I. B. (1960) The control of the spinose ear tick, *Otoibius megnini* (Duges, [sic] 1883), infesting horses, mules and cattle with 2 percent Dibrom-SG 67. (Program and Abstract, 35 Annual Meeting, American Society of Parasitologists, Los Angeles, November 2-5). *Journal of Parasitology*, 46, Sect. 2, Supplement: 6. (The sorptive dust SG 67, impregnated with 2% Dibrom 8 Emulsive, was found to be effective for the control of *O. megnini*.)

Tarshis, I. B. (1960) Control of the snake mite (*Ophionyssus natricis*), other mites, and certain insects with sorptive dust, SG 67. *Journal of Economic Entomology*, 53, 903-908. (Rapid death of many arthropods, including *O. megnini*, has been accomplished due to dessication by adsorption of the lipid layer by SG 67.)

Tarshis, I. B. (1961) Laboratory and field studies with sorptive dusts for the control of arthropods affecting man and animals. *Experimental Parasitology*, 11, 10-33. (Rapid death of numerous arthropods, including *O. megnini*, was accomplished experimentally through dessication.)


Tarshis, I. B. (1967) Silica aerogel insecticides for the prevention and control of arthropods of medical and veterinary importance. *Angewandte Parasitologie*, 8, 210-237. (Control of numerous arthropods, including *O. megnini*, with SG 67 and MEA 797.00 silica aerogels.)

Tarshis, I. B. & Ommert, W. D. (1961) Control of the spinose ear tick, *Otoibius megnini* (Duges) [sic] with an organic phosphate insecticide combined with a silica aerogel. *Journal of the American Veterinary Medical Association*, 138, 665-669. (The insecticide was 2% dimethyl 1,2-dibromo-2,2-dichloroethyl phosphate.)


Temple, I. U. (1912) Acute ascending paralysis, or tick paralysis. *Medical Sentinel*, 20, 507-514 (Nymphal *O. megnini* found in the ear of a man. This is the first record from Oregon. See also Nuttall, 1914.)

Theiler, A. (1917) Veterinary research: Annual Report of the Director 1915-1916. *Report Union of South Africa Department of Agriculture for the year ended 31st March 1916*, Capetown, pp. 45-49. (*O. megnini* first observed in 1912, and has been prevalent in various parts of the Union.)

Theiler, A. (1921) Diseases, ticks and their eradication. *Journal Department of Agriculture Union*
Theiler, A. (1921) Siektes, bosluise en die bestry daarvan. *Joernal van die Departement van Landbou Unie van Suid-Afrika*, No. 6, 1-22 (Same as above but in Afrikaans.)


Theiler, G. (1952) List of standardized tick names for South Africa. *Farming in South Africa*, reprint No. 49, 1-3. (Common name for *O. megnini* is the spinose ear tick.)

Theiler, G. (1962) *The Ixodoidea parasites of vertebrates in Africa south of the Sahara*. Project S.9958. Report to the Director of Veterinary Services, Onderstepoort. viii + 260 pp. (*Otobius megnini*, pp. 23-24. Present in Belgian Congo (Democratic Republic of Congo), Nyasaland (Malawi), Mocambique, Southern Rhodesia (Zimbabwe), Bechuanaland (Botswana), South West Africa (Namibia), Basutoland (Lesotho) and South Africa. She states, "*O. megnini* is an introduction from Mexico.")

Theiler, G. (1963) African ticks: The complexity of their host-encounter relationship: Disease and control. *Report 2nd Meeting FAO/OIE Expert Panel on Tick-borne Diseases of Livestock, Cairo 3-10 Dec. 1962*, 45-52. ("Tortoises have been recorded as hosts to the mammalian *Hyalomma truncatum* (A.I.), *Otobius megnini* and the burrow dwelling *Ornithodoros moubata* and *Rhipicephalus theileri*.")


Theiler, G. & Robinson, B. N. (1954) Tick survey VIII. Checklists of ticks recorded from the Belgian Congo and Ruanda Urundi, from Angola, and from Northern Rhodesia. *Onderstepoort Journal of Veterinary Research*, 26, 447-461, 3 maps. (*O. megnini* found in the Belgian Congo (Democratic Republic of Congo), possibly introduced from South Africa.)

Theiler, G. & Salisbury, L. E. (1958) Zoological survey of the Union of South Africa. Tick Survey: Part XI. The distribution of *Otobius megnini*, the spinose ear tick. *Onderstepoort Journal of Veterinary Research*, 27, 605-610, one map. (The species is absent from areas of high rainfall, but neither temperature nor altitude appears to play a limiting role in its distribution.)


Thompson, G. B. (1950) Ticks of Jamaica, B. W. I. Records and notes (including a summary of the distribution of the West Indian species). *Annals and Magazine of Natural History*, Series 12, 3, 220-229. (*O. megnini* is not known from Jamaica but is cited in a table as present in the U.S.A., Mexico, Central America, South America, and Cuba.)

Thomssen, E. G. & Doner, M. H. (1943) Livestock insect control. A study of insects which attack livestock and means for their practical control. Part II. *Soap and Sanitary Chemicals*, 19, 131-141. (In a table on common crawling insects attacking livestock, the duration of the egg stage of *O. megnini* is listed as 21 days.)


records and Dr. Toomey’s removal of *O. megnini* from the ear of a soldier stationed at Camp Stewart near El Paso, Texas in 1916.)


Torreggiani, G. (1914) Osservati nella fauna boliviana. *Il Nuovo Ercolani Archivio di Veterinaria e Zootecnia*, 19, 417-425. (Distribution and hosts of *O. megnini*, p. 420, and mention that his genus *Otophilus* should now be considered a subgenus of *Ornithodorus* and recognition that *Otophilus asini* is a synonym of *Ornithodorus megnini*).


Townsend, C. H. T. (1893) Ticks in the ears of horses. *Journal of the New York Entomological Society*, 1, 49-52. (An unnamed tick species, but obviously *O. megnini*, from a bronco, Las Cruces, New Mexico, March 1891. A Las Cruces physician on several occasions collected these ticks from the ears of children.)


Turk, R. D. (1951) Diagnosis of parasitism. *North American Veterinarian*, 32, 250-254. (Spinose ear ticks are sometimes present in considerable numbers, and they should be checked for especially in animals originating in the arid sections of southwestern U.S.A.)


Uilenberg, G. (1964) Notes sur les Hématozoaires et tiques des animaux domestiques à Madagascar. *Revue d’Élevage et de Médecine Vétérinaire des Pays Tropicaux*, 17, 337-359. (*O. megnini* is one of 13 tick species found on domestic animals on Madagascar.)

(Adult *O. megnini* are unaffected by concentrations of Sevin and D.D.T. that would be active against other tick species.)

Uilenberg, G. (1967) Note sur la piroplasmose équine à Madagascar. *Revue d’Élevage et de Médecine Vétérinaire des Pays Tropicaux*, 20, 497-500. (The vector of equine piroplasmosis remains unknown, but tick species found on horses are *Amblyomma variegatum* and *Boophilus microplus* in the Tananarive area. Both horses and stables were infested with *O. megnini*.)

Uilenberg, G., Hoogstraal, H. & Klein, J. M. (1979) Les tiques (Ixodoidea) de Madagascar et leur rôle vecteur. *Archives de l’Institut Pasteur de Madagascar Numéro Spécial*, 1-153. (*O. megnini* was introduced into Madagascar and is now a serious pest of domestic animals in Tananarive Province.)

Union of South Africa Department of Agriculture. (1914) Editorial notes. Ticks and Lamziekte. *Agricultural Journal of the Union of South Africa*, 8,1-3. (Two or 3 years ago Sir Arnold Theiler found a species of tick on a cow suffering from lamziekte (botulism) in Vryburg. This tick was subsequently identified as *O. megnini*. It is uncertain whether the tick was introduced from America, but it could have happened after the Boer War when thousands of Texas cattle were imported into South Africa.)

United States Department of Agriculture. (1909) Special report on diseases of cattle, revised edition, 1908. *Bureau of Animal Industry*, 551 pp. (*O. megnini*, p. 505, treatments include a 20% emulsion of crude petroleum distillate poured into the ears of cattle.)

United States Department of Agriculture. (1960) Insects affecting man and animals. *Co-operative Economic Insect Report*, 10, 970-971. (*O. megnini* is still being found on untreated native cattle in a herd near Porcupine, South Dakota)


United States Department of Agriculture. (1964) National tick survey calendar year 1963. *Animal Disease Eradication Division, Agricultural Research Service*, 7 pp. (Issued November 9, 1964). (228 *O. megnini* were collected on cattle, 31 on horses or mules, 19 on dogs, and in Arkansas and Texas on coyote and antelope, respectively.)


United States Department of Agriculture. (1966) National tick surveillance program calendar year 1965. *Animal Health Division, Agricultural Research Service*, 15 pp. (Issued May 10, 1966). (A total of 337 *O. megnini* were collected on cattle in Arizona, Arkansas, California, Colorado, Hawaii, Kansas, Louisiana, Mississippi, Missouri, Montana, Nebraska, Nevada, New Mexico, Oklahoma, Tennessee, Texas, Utah, Virginia, and Washington in 1965. It was also collected on cats, sheep, goats, dogs, horses and mules, and imported bovines.)

total of 119 *O. megnini* were collected on cattle in Arizona, California, Hawaii, Kansas, Nevada, New Mexico, Ohio, Oklahoma, Oregon, Tennessee, Texas, Utah, and Washington in 1966. It was also collected on humans, sheep, dogs, horses and mules and imported equines and bovines.)


United States Department of Agriculture. (1968) National tick surveillance program calendar year 1967. *Animal Health Division, Agricultural Research Service*, 15 pp. (Issued April 15, 1968). (A total of 133 *O. megnini* were collected on cattle in Arizona, Arkansas, California, Colorado, Georgia, Kansas, Nevada, New Mexico, Oklahoma, Oregon, Tennessee, Texas, and Washington in 1967. It was also collected on cats, sheep, goats, dogs, horses and mules and imported bovines.)


United States Department of Agriculture. (1971) National tick surveillance program calendar year 1970. *Animal Health Division, Agricultural Research Service*, ARS 91-102, 15 pp. (Issued July 1971). (A total of 61 *O. megnini* were collected on cattle in Alabama, Arkansas, California, Colorado, Hawaii, Kansas, Oklahoma, Oregon, and Texas in 1970. It was also collected on cats, sheep, goats, dogs, horses and mules and imported equines and bovines.)

United States Department of Agriculture. (1972) National tick surveillance program calendar year 1971. *Veterinary Services, Animal and Plant Health Inspection Service, APHIS* 91-8, 14 pp. (Issued November 1972). (A total of 83 *O. megnini* were collected on cattle in Alabama, Arkansas, California, Colorado, Nebraska, Nevada, New Mexico, Oklahoma, Oregon, and Texas in 1971. It was also collected on cats, sheep, dogs, horses and mules and imported equines and bovines.)

United States Department of Agriculture. (1973) National tick surveillance program calendar year 1972. *Veterinary Services, Animal and Plant Health Inspection Service, APHIS* 91-12, 15 pp. (Issued July 1973). (A total of 38 *O. megnini* were collected on cattle in Arizona, Colorado, Kansas, Missouri, Oklahoma, Tennessee and Texas in 1972. It was also collected on cats, swine, dogs, horses and mules, and imported equines and bovines. *Otoibius megnini*, p. 2, is known to be established in at least one county in eastern Tennessee.)


United States Department of Agriculture. (1974) National tick surveillance program calendar year
1973. Veterinary Services, Animal and Plant Health Inspection Service, APHIS 91-22, 15 pp. (Issued August 1974). (A total of 125 O. megnini were collected on cattle in California, Colorado, Kansas, Mississippi, Oklahoma, Oregon, and Texas in 1973. It was also collected on dogs, horses and mules, and imported zebra, equines and bovines.)

United States Department of Agriculture. (1975) National tick surveillance program calendar year 1974. Veterinary Services, Animal and Plant Health Inspection Service, APHIS 91-28, 17 pp. (Issued September 1975). (A total of 200 O. megnini were collected on cattle in Arkansas, California, Oklahoma and Texas in 1974. It was also collected on sheep, dogs, horses and mules, and imported bovines, gemsbok, bontebok, greater kudu, blesbok and hartebeest.)

United States Department of Agriculture. APHIS Cooperative Plant Pest Report, 1, 1-42. (O. megnini found in Oklahoma, and in Logan and Crawford Counties, Arkansas. These are new county records for this tick species.)

United States Department of Agriculture. (1976) National tick surveillance program calendar year 1975. Veterinary Services, Animal and Plant Health Inspection Service, APHIS 91-32, 15 pp. (Issued August 1977). (A total of 86 O. megnini were collected on cattle in California, Georgia, New Mexico, Oklahoma and Texas in 1975. It was also collected on sheep, dogs, horses and mules, and imported cattle, horses and goats.)

United States Department of Agriculture. (1977) National tick surveillance program calendar year 1976. Veterinary Services, Animal and Plant Health Inspection Service, APHIS 91-33, 17 pp. (Issued August 1977). (A total of 58 O. megnini were collected on cattle in California, Oklahoma, Oregon and Texas in 1976. It was also collected on dogs, horses and mules.)

United States Department of Agriculture. (1978) National tick surveillance program calendar year 1977. Veterinary Services, Animal and Plant Health Inspection Service, APHIS 91-35, 17 pp. (Issued October 1978). (A total of 89 O. megnini were collected on cattle in Arkansas, California, Colorado, Kansas, Oklahoma, Texas and Washington in 1977. It was also collected on dogs, horses and mules, goats and imported bovines.)

United States Department of Agriculture. (1979) National tick surveillance program calendar year 1978. Veterinary Services, Animal and Plant Health Inspection Service, APHIS 91-35, 17 pp. (Issued May 1980). (A total of 320 O. megnini were collected on cattle in California, Colorado, Kansas, New Mexico, Oklahoma, and Texas in 1978. It was also collected on horses and mules, imported bovines and on an ibex in New Mexico.)


United States Department of Agriculture. (1983) National animal health. Yearbook of Agriculture. xli + 646 pp. (O. megnini, p. 572, a one-host tick with only larvae and nymphs found on horses.)
United States Department of Agriculture. (1985) National tick surveillance program calendar year 1983. *Veterinary Services, Animal and Plant Health Inspection Service, APHIS* 91-39, 19 pp. (Issued February 1985). (A total of 647 *O. megnini* were collected on cattle in Texas in 1983. It was also collected on dogs, elk (originating in Craig County, Colorado and brought to South Carolina), and imported bovines.)

United States Department of Agriculture. (1985) National tick surveillance program calendar year 1984. *Veterinary Services, Animal and Plant Health Inspection Service, APHIS* 91-39, 17 pp. (Issued October 1985). (A total of 438 *O. megnini* were collected on cattle in California, Oklahoma, and Texas in 1984. It was also collected on horses and mules, an introduced Corsican sheep in Texas and imported couse deer and bovines.)


United States Department of Agriculture. (1987) National tick surveillance program calendar year 1986. *Veterinary Services, Animal and Plant Health Inspection Service, APHIS* 91-39, 19 pp. (Issued October 1987). (A total of 38 *O. megnini* were collected on cattle in Oklahoma and Texas in 1986. It was also collected on dogs and imported bovines.)


United States Department of Agriculture. (1994) National tick surveillance program calendar years 1988-89. Animal and Plant Health Inspection Service, APHIS 91-45-005, 43 pp. (Issued June 1994). (A total of 33 *O. megnini* were collected on cattle in Arkansas, California, Colorado, Oklahoma, and Texas in 1988 and 1989. It was also collected on cats, dogs, horses and mules, mule deer and bighorn sheep in Arizona, and imported horses and bovines.)


United States Naval Medical School. (1958) *Medical entomology*. Bethesda, Maryland. Compiled by the staff of the Entomology Division, National Naval Medical Center. viii + 342 pp. (*O. megnini*, p. 50, in the ears of horses and cattle, key, p. 53.)


Van Volkenberg, H. L. (1939) An annotated check list of the parasites of animals in Puerto Rico. *Puerto Rico Experiment Station Circular*, No. 22, 1-12. (Regarding the report cited immediately above, the author states, “Either a mistake was made in the determination of this tick or it has been eradicated by dipping operations against the cattle tick, for so far as is known it does not now occur in Puerto Rico.”)

Vargas, L. (1955) Relación del papel patogeno de las garrapatas y lista de las especies Mexicanas. *Gaceta Médica de México*, 85, 489-502. (*O. megnini* listed from Mexico, U.S.A., Argentina,
Brazil, Chile, South Africa, India, and incorrectly from Australia.)


Vogelsang, E. G. & Cordero, E. H. (1940) Las garrapatas [Ixodidae] de Venezuela. Revista de Medicina, Veterinaria y Parasitologia, 2, 71-76. (O. megnini was listed by Pinto (1930) as one of the tick species found in Venezuela.)


Wade, L. L. (1968) The efficacy of Durshbn® insecticide in dipping vat for control of the southern cattle tick. Journal of Economic Entomology, 61, 908-909. (He cites the works of Drummond using this insecticide on O. megnini.)


Walker, J. B., Mehlitz, D. & Jones, G. E. (1978) Notes on the ticks of Botswana. Eschborn, Germany, German Agency for Technical Cooperation. 83 pp. (O. megnini not recorded recently from Botswana, although Bedford (1925) reported that it was widely distributed in this country.)


Wanchinga, D. M. & Barker, R. W. (1986) Colonization and laboratory development of Otobius megnini (Acari: Argasidae). Journal of Economic Entomology, 79, 999-1002. (Mean engorgement times for larval and nymphal O. megnini when fed on cattle were 4.7±2.1, and 38.2±7.4 days, respectively. Moulting success of larvae and nymphs was 92.1 and 98.1%, respectively. Females were able to convert ca. 56% of their body weight to eggs.)


Warburton, C. (1923) Ticks. Encyclopaedia of veterinary medicine, surgery and obstetrics 1, 479-490. (O. megnini is found in Mexico and the southwestern United States infesting ears of the horse, ass, and ox, and frequently enters the human ear.)


Ward, H. B. (1900) The ticks of Nebraska. Studies from the Zoological Laboratory The University of Nebraska, No. 38, 193-205. (Reprint of the article immediately above.)

Ware, F. (1937) Entomology. Report of the Imperial Veterinary Research Institute Mukteswar (1935-1936), 37-39. (O. megnini from the ears of Australian horses was sent to the Institute from the Military Veterinary Hospital, Saugor, Central Provinces. Ware states that the occurrence of this species of tick had not been previously recorded from India - but see Kingston, 1936. Cecil Warburton, Cambridge University confirmed the identification.)


Weber, W. J. (1984) Fleas, ticks and cockroaches - disease transmitters. P. O. Box 9335, Fresno, CA 93791, Thomson Publications. (O. megnini, p. 6, not known as a disease vector, but the causative agent of Q fever has been isolated from it, and the tick can cause severe irritation.)

Wellcome Research Organisation. (1970) Cattle tick control. London, Cooper Division, Wellcome Foundation Ltd. 65 pp. (O. megnini, p. 8, map 6, larvae and nymphs parasitic within host's ears for several months, drop to the ground, mate and produce eggs without further feeding.)

Weyer, F. (1948) Grundriss der Medizinischen Entomologie. Zweite Durchgesenehene. Leipzig, Johann Ambrosius Barth. vii + 132 pp. (Otobius megnini, p. 39, a stationary parasite; p. 40, an ear tick; p. 96, cited as the feared ear tick of cattle.)

Weyer, F. (1953) Die Beziehungen des Q-Fieber-Erregers (Rickettsia burneti) zu Arthropoden. Zeitschrift für Tropenmedizin und Parasitologie 4, 344-382. (O. megnini, brief mention, p. 360, and in Table 4 citing the work of Jellison, Bell et al., 1948.)

Weyer, F. & Zumpt, F. (1952) Grundriss der Medizinischen Entomologie. Dritte umgearbeitete Auflage. Leipzig, Johann Ambrosius Barth. vi + 150 pp. (Otobius megnini, p. 40, an ear parasite; p. 110, O. megnini is again cited as the feared ear tick of cattle.)


Wharton, R. H. & Roulston, W. J. (1970) Resistance of ticks to chemicals. Annual Review of Entomology, 15, 381-404. (O. megnini has been controlled for many years in North America with
gamma benzene hexachloride.)


Wheler, E. G. (1901) Note on a remarkable stigmatic organ in the nymph of *Ornithodoros* (or *Argas*) *megenini* (Dugès). *Lancet*, (4052), 1, 1198. (A note appended to Simpson, 1901.)

Wheler, E. G. (1901) Note on a remarkable stigmatic organ in the nymph of *Ornithodoros megnini* (Dugès). *Journal of the Quellet Microscopical Club*, Series 2, 8, 61-62. (Specimens of *O. megnini* obtained from Simpson, 1901.)

Wheler, E. G. (1906) British ticks. *Journal of Agricultural Science*, 1, 400-429. (Description of nymphal *O. megnini* based on specimens from Simpson, 1901.)


Wilson, S. G. (1950) A check-list and host-list of Ixodoidea found in Nyasaland, with descriptions and biological notes on some of the rhipicephalids. *Bulletin of Entomological Research*, 41, 415-428. (First record of *O. megnini* from Nyasaland, now Malawi.)


of the American Microscopical Society, 91, 348-363. (O. megnini, p. 355, figs. 2-4 of spiracular plate.)


Worcester, W. W. (1963) Veterinary laboratory services. Bulletin of the California Department of Agriculture, 52, 80-81. (Forty-two lots of ticks were received and identified; most were O. megnini.)

Worley, D. E., Barrett, R. E., Presidente, P. J. A. & Jacobson, R. H. (1969) The Rocky Mountain elk as a reservoir host for parasites of domestic animals in western Montana. Proceedings Annual Conference Bulletin Wildlife Disease Association, 5, 348-350. (“The ear tick (O. megnini) has been reported in isolated instances on cattle in southeastern Montana, and on several occasions on dogs and cats in other parts of the state. However, the first report of the ear tick on elk was in 1968 on 2 yearling cows from the upper Lamar drainage in Yellowstone Park. This raises the question whether its erratic appearance in cattle and other domestic animals may result from contact with infested wildlife reservoirs which maintain the parasite on a permanent basis.”)


Zimmerman, E. C. (1944) A case of bovine auricular myiasis and some ectoparasites new to Hawaii. Proceedings of the Hawaiian Entomological Society, 12, 199-200. (O. megnini found in the ears of a cow on the island of Molokai.)

Acknowledgements

First and foremost, we are sincerely grateful to Cynthia Frost, Assistant Access Services Librarian at Georgia Southern Universitys Henderson Library, for unwavering assistance in obtaining articles for this bibliography. We also thank Jennifer Taylor and Sadia Ajohna of the Institute of Arthropodology and Parasitology, Georgia Southern University, who were most helpful in unearthing obscure Otobius megnini references, Elizabeth Mason, North Dakota State University Library, Richard Robbins, Armed Forces Pest Management Board, Washington, D. C. for computer searches in various databases, and Anne Baker for bibliographical assistance during visits by JEK to the Entomology and Zoology Libraries of The Natural History Museum, London in 1997, 1999 and 2001. Thanks also to Donald Mock, Kansas State University, John Lloyd, University of Wyoming, and Pete Teel, Texas A & M University for supplying state bulletins. Alberto Guglielmone, Instituto Nacional de Tecnología Agropecuaria, Rafaela, Argentina was most helpful in assisting us with O. megnini literature from South America. This research was supported in part by National Institute of Allergy and Infectious Diseases grant AI 40729 to J Ek.

Accepted: 1 November 2002
Published: 10 January 2003