1997. The Journal of Arachnology 25:106–108

RESEARCH NOTE

A NOTE ON *EUSCORPIUS CARPATHICUS* (SCORPIONES, CHACTIDAE) FROM THE CRIMEA

Euscorpius carpathicus (L. 1767) (Chactidae), a scorpion species fairly common in southern Europe where it ranges from Spain to Ukraine, has been extensively studied (e.g., Birula 1917; Hadzi 1930; Caporiacco 1950; Vachon, 1963, 1975, 1978; Ćurčić 1972; Kinzelbach 1975; Fet 1986; Sherabon, 1987). There are 24 described subspecies; and, for most, the taxonomic status is unclear. Many of these forms are somewhat geographically isolated; for example, nearly every Mediterranean island (e.g., Mallorca, Sardinia, Sicily, Crete) has an endemic subspecies.

The Crimea Peninsula (currently an administrative territory within Ukraine) houses the easternmost, disjunct population of *E. carpathicus.* It is the only species of scorpion found in the Crimea. This population was first recorded from Alupka by Pallas (1795). It was described by C.L. Koch (1838) as *Scorpius tauricus* and for many years was treated as a separate, endemic species. Birula (1917) listed it as *Euscorpius tauricus* (C.L. Koch) and gave a detailed description of its anatomy and biology. Caporiacco (1950) synonymized it as a subspecies of *Euscorpius carpathicus* (L.). The original material from the Crimea has not been analyzed since 1917.

The studied sample included 71 specimens (17♂, 54♀) from the following localities of the Crimea Peninsula (area between 33–35°E and 44–45°N): Alushta, Balaklava, Frunzenskoye, Gaspra, Inkerman, Kerch', Nikitsky Botanical Garden, Oreanda, Sevastopol', Simeiz, Simferopol', Sudak, Yalta, Yevpatoria. The studied specimens are deposited in the Zoological Institute of the Russian Academy of Sciences (St. Petersburg, Russia) and in the Zoological Museum of the Moscow State University (Moscow, Russia). Detailed label data are published in Fet (1989). The majority of this material originated from the Black Sea coast (southern parts of the peninsula), known for its mild climate due to the protection of the Yaila range which runs latitudinally across the peninsula.

Following the technique developed for scorpions by Vachon (1963, 1975), I scored numbers of trichobothria on the pedipalp patella, which, in *Euscorpius,* vary both among and within local populations. Ventral trichobothria form a single row (Tv), whereas external ones appear in six clusters: terminal (*et*), subterminal (*est*), median (*em*), suprabasal (*esb*), and two basal groups (eb_a and *eb*). There is no sexual dimorphism. Numbers may vary between left and right pedipalp, but such asymmetry is a subject of a separate study.

Trichobothrial numbers scored for the Crimean population were: Tv = 7 (20 cases, 14.3%), Tv = 8 (119 cases, 85.0%) and Tv = 9 (1 case, 0.7%%) (number of scored pedipalps, 140); *et* = 5 (14 cases, 10.0%), *et* = 6 (126 cases, 89.4%) and *et* = 7 (1 case, 0.6%) (n = 141). Numbers of external trichobothria in other five groups did not vary and were: *est* = 4, *em* = 4, *esb* = 2, eb_a = 4, *eb* = 4. Although some authors (Ćurčić 1972; Kinzelbach 1975) attempted to discuss clinal variation in trichobothria within *E. carpathicus,* few data are published that can be used for comparison to the population above. Kinzelbach (1975) gave an qualitative overview of many samples from the Balkan Peninsula and the Aegean Sea islands, using only the Tv index. He recognized not one but two species: an "oligotrichous" *E. carpathicus* (L.) with Tv = 7–8 and a "polytrichous" *E. mesotrichus* Hadzi with Tv = 10–12, which produce hybrid "mesotrichous" forms with Tv = 9–10. This division was not accepted by other authors (Vachon 1978; Fet 1986, 1989; Scherabon 1987).

The Crimean population has values of Tv close to 8 (mean Tv = 7.86, s^2 = 0.13) and *et* close to 6 (mean *et* = 5.90; s^2 = 0.10). Tv from 7–8 and *et* = 6 are found in certain populations from northeastern Greece (Kinzel-

bach 1975; Fet 1986). On the other hand, trichobothrial numbers of Tv = 9–10 and *et* = 7, which are common throughout the Balkans and Crete (Fet 1986), are very rare (< 1%) in the analyzed Crimean sample. Populations of *E. carpathicus* farther westward are characterized by the forms with higher values of Tv = 10–12, and *et* = 7–8, e.g., in Austria (mean Tv = 10.25, s^2 = 1.04; mean *et* = 7.47, s^2 = 0.38; Scherabon 1987) or Sardinia (mean Tv = 11.01, s^2 = 0.36; mean *et* = 7.32, s^2 = 0.67; Vachon 1978). Means of trichobothrial scores of the Austrian and Sardinian populations are not significantly different; *t*-values are 0.93 for Tv ($P > 0.5$) and 0.28 for *et* ($P > 0.7$). However, the mean of the Crimean population significantly differs from a combined Austria/Sardinia sample (mean Tv = 10.67, s^2 = 0.30; mean *et* = 7.40; s^2 = 0.40). For this comparison, *t*-values are 6.85 for Tv ($P < 0.001$) and 2.74 for *et* ($P < 0.01$). According to Kinzelbach's (1975) terminology, the Crimean population is the *sensu stricto* "oligotrichous" *E. carpathicus* (L.).

The isolated zoogeographic position of this Crimean scorpion, and that of many Crimean animal and plant populations, is unique for the species' range: the closest populations of *E. carpathicus* are those in Romania, about 500 km westward. The reason for such disjunction should be sought in the paleogeographical history of the Crimea, which is relatively well studied (Golovach 1984). This area originated as an island of the Tethys Sea during the Mesozoic and throughout the Tertiary period was connected many times to different land masses (Caucasus, Balkan Peninsula, Anatolia, and/or modern Ukraine) when the sea regressed. There are no Tertiary relicts in the Crimea; and all endemic plants there are generally very recent (Grosset 1979). Severe Pleistocene glaciations in Europe (the last one, the Würm Ice Age, 70,000–11,000 years BP, corresponds to the Wisconsin of North America) could have eliminated most of ancient thermophile and mesophile Mediterranean species of the Crimea. Golovach (1984) analyzed the diplopod fauna in the Crimea, and suggested that its age is primarily Pleistocene and the source of migration was the eastern Mediterranean, especially the Balkan Peninsula. It can be suggested that the existence of *E. c. tauricus* is the a result of a (possibly recent) migration from the Balkan Peninsula in the Pleistocene interglacials. The source of such migration, then, should have been "oligotrichous" populations of eastern Balkans (with Tv = 7–8 and *et* = 6). Further comparative studies should assess the criteria for subspecific structure of *E. carpathicus.*

ACKNOWLEDGMENTS

I thank Vladimir I. Ovtsharenko (St. Petersburg) and Kirill G. Mikhailov (Moscow) for their permission to work with Russian museum collections; and W. Starega (Warsaw, Poland) for the loan of material. I am especially thankful to Mikhail Eidelberg, Sergei Sharygin, and Konstantin Yefetov who collected scorpions from the Crimea on my request, and to Matt Braunwalder (Zurich, Switzerland) for his constant and invaluable help in obtaining literature.

LITERATURE CITED

Birula, A. (Byalynitsky-Birula, A.A.). 1917. Fauna of Russia and adjacent countries. Arachnoidea. Vol. I. Scorpions. Petrograd, 224 pp. (in Russian); English translation by Israel Program for Scientific Translations, Jerusalem 1965, 154 pp.

Caporiacco, L. di. 1950. Le specie e sottospecie del genre "*Euscorpius*" viventi in Italia ed in alcune zone confinanti. Memorie/Accademia nazionale dei Lincei. Classe di scienze fisiche, matematiche e naturali, (8) 2 Scz. 3a, 4:159–230.

Ćurčić, B.P.M. 1972. Considerations upon the geographic distribution and origin of some populations in the genus *Euscorpius* Thorell (Chactidae, Scorpiones). Rapp. Comm. Internat. Mer Mediterranée, Monaco, 21:83–88.

Fet, V. 1986. Notes on some *Euscorpius* (Scorpiones, Chactidae) from Greece and Turkey. Riv. Mus. Scien. Natur. E. Caffi (Bergamo), 9:3–11.

Fet, V. 1989. A catalogue of scorpions (Chelicerata: Scorpiones) of the USSR. Riv. Mus. Scien. Natur. E. Caffi (Bergamo), 13:73–171.

Golovach, S.I. 1984. Distribution and faunogenesis of the Diplopoda of the European USSR. Pp. 92–138, *In* Faunogenesis and Phylocenogenesis. (Chernov, Yu.I., ed.). Nauka, Moscow (in Russian).

Grosset, G.E. 1979. On the origin of flora of the Crimea. Byulleten MOIP (Bull. Moscow Soc. Natur.), Div. Biol., Part 1; 84:64–84; Part 2; 84: 35–55 (in Russian).

Hadzi, J. 1930. Die europäischen Skorpione des Polnischen Zoologischen Staatsmuseums in Warszawa. Annal. Mus. Zool. Polonici, 9:29–38.

Kinzelbach, R. 1975. Die Skorpione der Agäis. Beiträge zur Systematik, Phylogenie und Biogeographie. Zool. Jahrb. (Syst.), 102:12–50.

Koch, C.L. 1838. Die Arachniden. C.H. Zeh'sche Buchhandlung, Nürnberg, 4:1–144.

Pallas, P.S. 1795. A brief physical and topographical description of the Taurian Region. St. Petersburg (in Russian).

Scherabon, B. 1987. Die Skorpione Österreiches in vergleichender Sicht unter besonderer Berücksichtung Kärntens. Pp. 77–154, *In* Karinthia II, 45. Sonderheft, Klagenfurt.

Vachon, M. 1963. Remarques sur l'utilisation, en systématique, des soies sensorielles (trichobothries) chez les Scorpions du genre *Euscorpius* Thorell (Chactidae). Bull. Mus. Nat. d'Hist. Natur. (Paris), 34:347–354.

Vachon, M. 1975. Recherches sur les Scorpions appartenant ou déposés au Muséum d'Histoire naturelle de Genève. 1. Rev. Suisse Zool., 82: 629–645.

Vachon, M. 1978. Remarques sur *Euscorpius carpathicus* (Linné, 1767) *canestrinii* (Fanzago, 1872) (Scorpionida, Chactidae). Annal. Hist.-Natur. Mus. Nat. Hungarici, 70:321–330.

Victor Fet: Department of Biological Sciences, Marshall University, Huntington, West Virginia 25755-2510 USA

Received 1 March 1996, revised 11 October 1996.