Studies on Neotropical Fauna and Environment
2001, Vol. 36, No. 3, pp. 199–204

0165-0521/01/3603-199$16.00

A New Neotropical Species of *Spercheus* Kugelann, and its Larval Stages (Coleoptera, Hydrophiloidea: Spercheidae)

Miguel Archangelsky

Conicet, Anillaco, La Rioja, Argentina

Abstract

Spercheus halophilus n. sp. is described together with its egg case and larval stages. This is the second Neotropical species for the genus. Comparative notes with adults of related species are included: *S. halophilus* seems closely related to *S. fimbriicollis* Bruch, 1915 and *S. spangleri* Hebauer, 1990. Larvae of *S. halophilus* show several important differences when compared with those of *S. emarginatus* (Schaller, 1783) and *S. cerisyi* Guérin-Meneville, 1842, most of them related to the mouthparts. This species lives in temporary pools of water gathered along the margins of roads running through a large salt flat in Central Argentina. Notes on the biology of this species are also included.

Resumen

Spercheus halophilus n. sp. es descripta junto con su desove y estados larvales. Esta es la segunda especie Neotropical del género. Se incluyen notas comparativas: *S. halophilus* parece más cercana a *S. fimbriicollis* Bruch, 1915 y *S. spangleri* Hebauer, 1990. Las larvas de *S. halophilus* presentan importantes diferencias cuando son comparadas con las de *S. emarginatus* (Schaller, 1783) y *S. cerisyi* Guérin-Meneville, 1842, especialmente en las piezas bucales. Esta especie vive en cuerpos de agua temporarios que se forman a los costados de caminos que cruzan una gran salina en el centro de Argentina. Notas sobre la biología de esta nueva especie también se incluyen.

Keywords: *Spercheus*, Hydrophiloidea, Coleoptera, larvae, Argentina.

Introduction

The family Spercheidae is a homogeneous group of beetles, composed of only one genus, *Spercheus* Kugelann. Recent revisions (Hansen, 1991; Hebauer, 1997, Archangelsky, 1997) mention this family as having 16 species, most of them from the Ethiopian and Oriental zoogeographical regions. Recently, the number of species has increased to 17 since Hebauer (1999) described a new species from Australia.

Up to now only one species was known from the Neotropical region, *Spercheus fimbriicollis* Bruch, 1915, from Argentina, Brazil, Bolivia and Paraguay (Reichart et al., 1975; Trémouilles et al., 1995; Hebauer, 1997; Fernández & Bachmann, 1998). While conducting a study on water beetles associated with saline waters in Salinas Grandes (Córdoba province, close to the border with the province of Catamarca, Argentina) one male specimen of *Spercheus* was collected. It resembled very much those of *Spercheus fimbriicollis*, but a closer look revealed several differences, mostly related to the shape and sculpture of the pronotum and elytra. The study of the male genitalia confirmed this specimen as belonging to a new species, which is described here. A few more trips during the following summer season (January–February 2000) allowed the collection of more live adults, which were reared in the laboratory. From these several egg cases and larvae were obtained, and are also described and compared with those of *S. emarginatus* (Schaller, 1783) and *S. cerisyi* Guérin-Meneville, 1842. Information on the biology of this new species is also included, as well as some remarks on the genus.

Materials and methods

Adults of the new species were found in temporary pools of saline water collected at the sides of a dirt road connecting the locality of Totoralejos with Rd. 60 (Argentina, Córdoba province, 29°37′26″S, 64°50′23″W, 185 m, 29°C, pH 9.5–9.9). This locality is within the northeastern limit of the 'Salinas Grandes', a large salt flat shared by the provinces of Córdoba, Catamarca, and La Rioja.

Received: 7 April 2000
Accepted: 23 February 2001

Correspondence: M. Archangelsky, La Rioja Regional Center for Scientific Research and Technologic Transference, Crilar (Conicet – UNLaR), Entre Ríos y Mendoza s/n, (5301) Anillaco, La Rioja, Argentina. Fax: +54 3827 49-4231; E-mail: marchangelsky@crilar.com.ar

Adult specimens were carried alive to the laboratory in plastic containers; algae and some water were used to keep them moist and protected. Once in the laboratory they were placed in larger clear plastic containers (20 cm long by 8 cm wide by 9 cm high), with a perforated lid; soil, sand and algae from the collection site were used as a substrate for the beetles. The containers were slightly inclined in order to provide an artificial littoral habitat, on one half water and algae were placed, and on the other soil and sand. Females carrying egg cases were transferred to smaller containers. In order to prevent cannibalism first instar larvae from the first egg case were placed in tissue culture plates with 12 cells (one larva per cell), some algae, detritus, and water (3–4 mm deep) were added. Larvae were fed and moved to clean cells every day, but mortality was high; only a couple of larvae reached the second instar. The food provided were live dipteran larvae, mostly chironomids, but larvae were seen feeding on the detritus covering the algae (small mats of filamentose algae). Larvae from the next three egg cases were left in the same container where the female was, with plenty of algae, sand, and small branches. Here larvae fed on the algae and organic matter covering the rocks and small branches, suggesting that they are not predators but scavengers. Only a few larvae reached the third instar, none was able to pupate.

Larvae were fixed with boiling water, and stored in 75% alcohol; adults were killed in alcohol, and cleaned before mounting them on points. Descriptions and drawings were done using a Leitz MZ12 dissecting scope and a Leica DML compound scope, both with camera lucida.

Material examined

Adults and larvae of *S. emarginatus*: Italy, Calvatone-Cremora Prov., WWF Nat. Res. 'Le Bine' 28-iv.1996. M. Toledo leg. Larvae of *S. cerisyi*: South Africa, C. P. 11 m NE Townsrivier. 4.iii.1968. P.J. Spangler leg. Adults of *S. fimbriicollis*: Argentina, Formosa province, 22 km W Clorinda, 26.i.1989. C.W. & L. O'Brien & G. Wibmer leg. Paraguay, Departamento San Pedro, Carumbé, i.1971. R. Golbach leg. Bolivia, D° Cochabamba, Pcia. Chapare, S.F. del Chipiriri 400 vm, xi.1954. Martínez leg.

Results

Spercheus halophilus n. sp.

Size: 3.4–3.9 mm long; 1.6–1.95 mm wide. Body strongly convex, dorsal surface of head and pronotum uniformly castaneous, dark, shiny; elytra of similar color except for longitudinal carinae which have dark and light maculae.

Head: subtrapezoidal, eyes small, located on external angles. Clypeus large, reflexed marginally, with anterior deep emargination. Frons forming two large interocular swellings. Frons and clypeus separated by deep suture. Labrum partially covered by clypeus; mentum strong, dark brown, subrectangular, two times wider than long, rugose; palpi and antennae light brown, antennae 7-segmented.

Pronotum (Fig. 1): strongly convex, subtrapezoidal, wider than long, lateral margins irregularly branched, with short and stout setae at apex of each branch; disk shiny, uneven and humpy, with median groove bearing few deep punctures; several more punctures on sides of disk. Scutellum small, slightly longer than wide. Elytra slightly wider than pronotum, broadly explanate laterally and with serrated margin. Each elytron with four longitudinal carinae, inner three strong, marginal one weaker. First interval, between sutural stria and first carina with a double row of deep punctures on anterior half, posterior half with three rows; remaining intervals with three rows of punctures.

Prosternum: simple, without carinae or grooves. Mesosternum with small middle hump. Metasternum convex, with deep middle cavity between metacoxae. Thoracic sterna granulose, with fine and sparse pubescence (plastron). Five abdominal sternites visible, surface of sternites granulose; sterna 1–4 with few short setae on posterior margin, sternum five with few short setae on posterior half. Legs six-segmented; coxae large, transverse; femora stout, granulose, with sparse short setae; tibiae slender, with six longitudinal rows of short spines; tarsi four-segmented.

Aedeagus (Fig. 2): stout. Median lobe slightly longer than parameres, wide on basal three quarters, evenly narrowing on distal end; falotreme wide, preapical. Parameres stout, curving mediad on distal half. Basal piece simple, subrectangular, wider than long.

Type material

Holotype (male) and 18 Paratypes (males and females) from: ARGENTINA: Córdoba province, Totoralejos & Rt. 60; N Salinas Grandes; 29°37′26″S, 64°50′23″W; 185 m, leg. M. Archangelsky. Holotype collected on 25.ii.1999; seven Paratypes on 23.i.2000; remaining 11 Paratypes on 16.ii.2000.

Holotype and 14 paratypes deposited at the 'Museo Argentino de Ciencias Naturales, Bernardino Rivadavia,' Buenos Aires, Argentina; two paratypes deposited at the Entomology Collection of CRILAR, La Rioja, Argentina; two paratypes deposited at the Entomology Collection of the National Museum of Natural Sciences (Smithsonian Institution), Washington DC, USA.

Diagnosis

Recognized by the irregularly branched lateral margins of the pronotum, the high and narrow elytral carinae, the rounded elytral apices, the high pronotal humps, and the wide median lobe of the aedeagus.

Etymology

The specific name is derived from the greek words *halós* = salt, and *philein* = to love, which refer to the habitat in which this species lives.

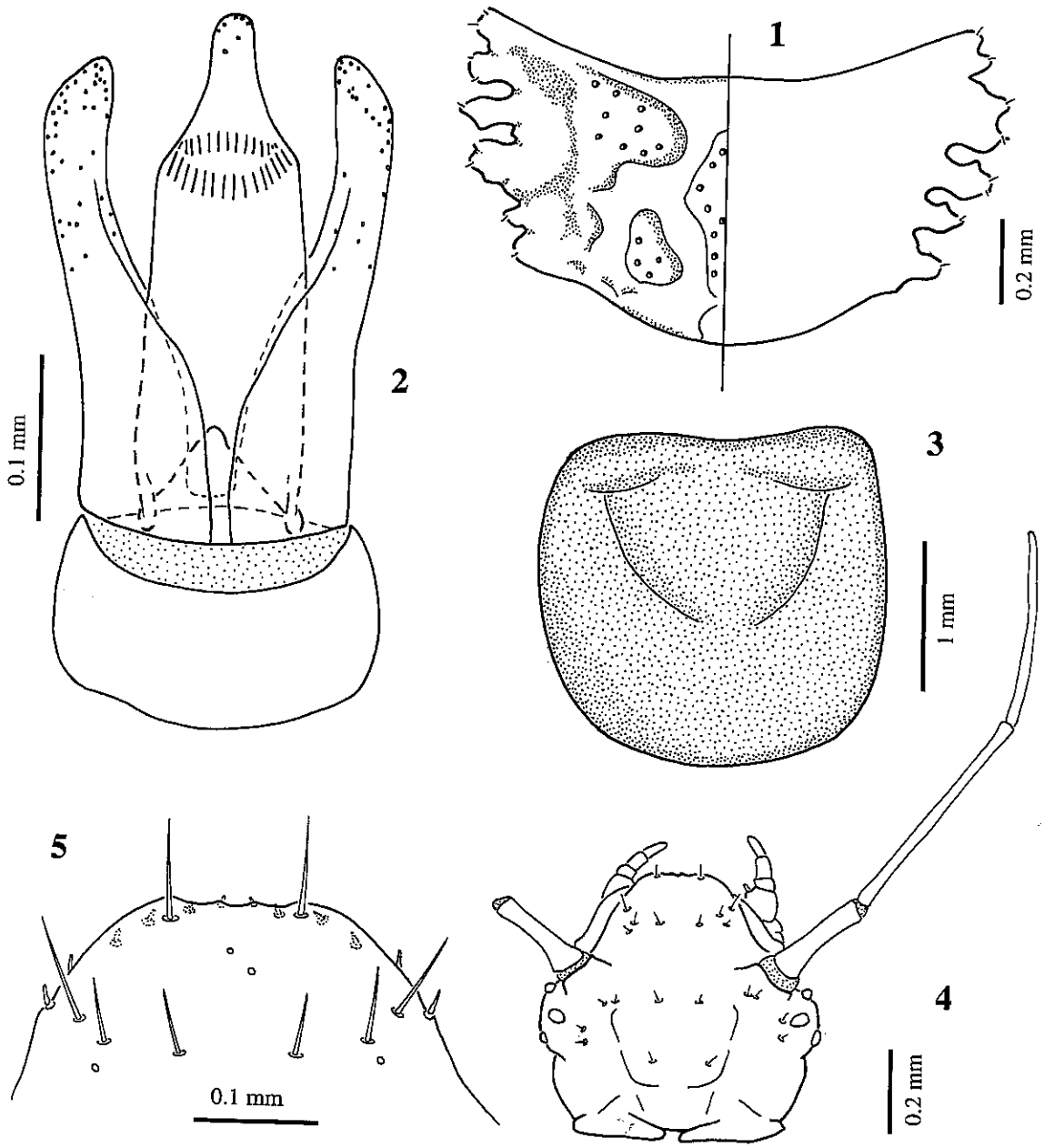

Plate I. *Spercheus halophilus* n. sp. Fig. 1. Adult pronotum, dorsal view. Fig. 2. Aedeagus of holotype. Fig. 3. Egg case, ventral view. Fig. 4. Third instar larva, head, dorsal view. Fig. 5. Third instar larva, labroclypeus, dorsal view.

Comparative notes

Although at first sight specimens of *S. halophilus* n. sp. look very similar to those of *S. fimbriicollis*, they can be easily recognized. The elytra of both species carry four longitudinal carinae, the inner two are the more developed, and they are higher in *S. halophilus* n. sp. than in the other species; on the other hand, these two carinae become thicker and form an angled 'elbow' on the distal fourth in *S. fimbriicollis*, the same carinae of *S. halophilus* n. sp. are narrow and even all along the way. The apex of the elytra is also different, those of *S. fimbriicollis* are extended in two long spines while those of the new species are rounded. The humps of the pronotum are higher in *S. halophilus* n. sp. Finally, the male genitalia differ in the two species, the median lobe in *S. fimbriicollis* is narrow in the distal half, that of *S. halophilus* n. sp. narrows in the distal quarter.

Regarding sexual dimorphism, there is a very small difference in the shape of the clypeus between males and females (anterior corners rounded in females and angulate in males), this is similar to what is seen in *S. emarginatus* (Hansen, 1991; Hebauer, 1999), but less pronounced; in some specimens it is difficult to determine the sex. This was also observed in *S. fimbriicollis* by Reichardt et al. (1975) who mention 'Two similar specimens were dissected, and turned to be male and female'.

S. halophilus n. sp. shares some characters with other species of the genus, from an adult point of view, but it seems that the more closely related ones are *S. fimbriicollis* and *S. spangleri* Hebauer, 1990. The three species share a more or less branched pronotum and a similar shape of genitalia; most of the known species (Ethiopian, Oriental and Australian) have a very broad median lobe, with narrow parameres while the two Neotropical species and *S. spangleri* (from Thailand) have a narrower median lobe and well developed parameres. Other characters that *S. halophilus* n. sp. shares with *S. fimbriicollis* are the four-segmented tarsi and the two interocular humps; this last character is also present in *S. burgeoni* d'Orchymont, 1929 (from Africa). At the same time *S. fimbriicollis* and *S. burgeoni* have in common the extended apex of the elytra, something absent in *S. halophilus* n. sp.

Finally, it is interesting to point out here that the diagnosis for the genus *Spercheus* mentions it as having five-segmented tarsi (Hansen, 1991). In specimens of *S. emarginatus*, the five tarsal segments are easily seen, but in *S. halophilus* n. sp. and *S. fimbriicollis* there are only four, as was confirmed by clearing a middle leg of one *S. halophilus* n. sp. specimen and mounting it on a microscope slide. It would be interesting to check this character in the remaining specimens of the genus since it could be important from a phylogenetic point of view.

Larval stages of *Spercheus halophilus* n. sp.

Egg case: Subquadrate (Fig. 3), with rounded corners, 1.8–2.3 mm long, 1.8–2.2 mm wide, and 1.1–1.3 mm high. Anterior margin straight to concave, lateral and posterior margins convex. Made of a thick layer of silk, carried by the female on underside of abdomen, and kept in place by hind legs. Number of eggs 35–45 (based on emerged larvae).

Third instar larva: Length 3.7–4.0 mm, campodeiform, whitish, except for sclerotized areas, which are brown.

Headcapsule (Fig. 4): subpentagonal, subprognathous. Labroclypeus (Fig. 5) symmetrical, trapezoidal, with several pairs of long and short setae; lobes of epistome not developed. Frontal sulci converging towards occipital foramen, ecdysial line absent in third instar larvae. Cervical sclerites absent; gular sclerite large, subrectangular, wider than long, with lateral constriction in the middle. Five stemmata on each side of head.

Antennae three-segmented (Figs. 4, 6 and 7): very long and slender, twice as long as head. Basal segment the shortest, without setae; second segment the longest, with three setae, distal sensory appendage reduced; third segment with one seta on basal half and several short setae and sensoria on apex.

Mandibles (Figs. 8 and 9): symmetrical, wide at the base, narrowing towards apex. Distal end bifid, with several small subapical toothlets in ventral view, one small inner tooth on basal half. Outer margin with one long seta, dorsal surface glabrous, ventral surface with several rows of small cuticular spines below subapical toothlets.

Maxillae (Fig. 10): five-segmented, short and stout. Cardo large, subquadrate, with one long ventral seta. Stipes short, wide and stout, bearing large lacinia on inner margin; mesal surface of lacinia hollow, surrounded by long slender cuticular spines and three long apical setae, one more slender seta at base. Palpi four-segmented; basal segment the largest, subquadrate with three slender setae and several small spines, also carrying long inner process inserted ventrally; second segment the shortest, glabrous; third segment subquadrate, with two slender apical setae on outer margin; last segment conical, with one long inner seta at base and several apical short apical sensoria.

Labium (Fig. 11): formed by submentum and prementomentum (fusion of mentum and prementum). Submentum narrow, subrectangular, wider than long. Prementomentum subrectangular, longer than wide, with two rows of cuticular spines on each lateral margin, first pair dorsal, with long spines, second pair ventral, with short spines; one more U-shaped pair of dorsal spines at base. Palpi short, one-segmented, with few short spines at base; ligula reduced, formed by four small lobes placed between palpi.

Pronotum: strongly sclerotized, subrectangular, with sagittal line. Mesonotum with a narrow subrectangular sclerite on each side of midline; metanotum with one pair of anterior minute triangular sclerites. Sternal areas unsclerotized. Legs five-segmented, long, visible in dorsal view.

Abdomen: ten-segmented, segments nine and ten reduced. Segments one to seven dorsally with a transverse row of six setiferous lobes on each side of midline, three large lobes intercalated with three small ones. Segment eight small, with large dorsal oval plate covering spiracular atrium. Small sclerotized fingerlike appendage (Fig. 12) on posterior margin of seventh sternum, margined by a pair of small fleshy lobes.

Material studied

5 egg cases, 25 first instar larvae, 2 second instars and 4 third instars, all reared in the laboratory.

Comparative notes

The size of first instar larvae ranges between 1.5 and 1.7 mm, that of second instars between 2.2 and 2.5 mm. First instar larvae of *S. halophilus* n. sp. have longer antennae than third instars (2.2 to 2.4 times the length of the headcapsule); the third segment is the longest, as long as the second, and the basal segment is proportionally shorter. Another difference found in the antenna is that the second segment in first instars is rugose, while in third instars it is smooth. First and second instar larvae have a well developed ecdysial line formed by the frontal suture. The fingerlike appendage of the abdomen is also present in first and second instars; proportionally it is larger in first instars, and it is used by the larvae to help support themselves while they move on the substrate. This appendage can be retracted and protracted.

I have compared the larvae of *S. halophilus* n. sp. with those of *S. emarginatus* and *S. cerisyi*. Several important differences have been found, mostly in the mouthparts. In *S.*

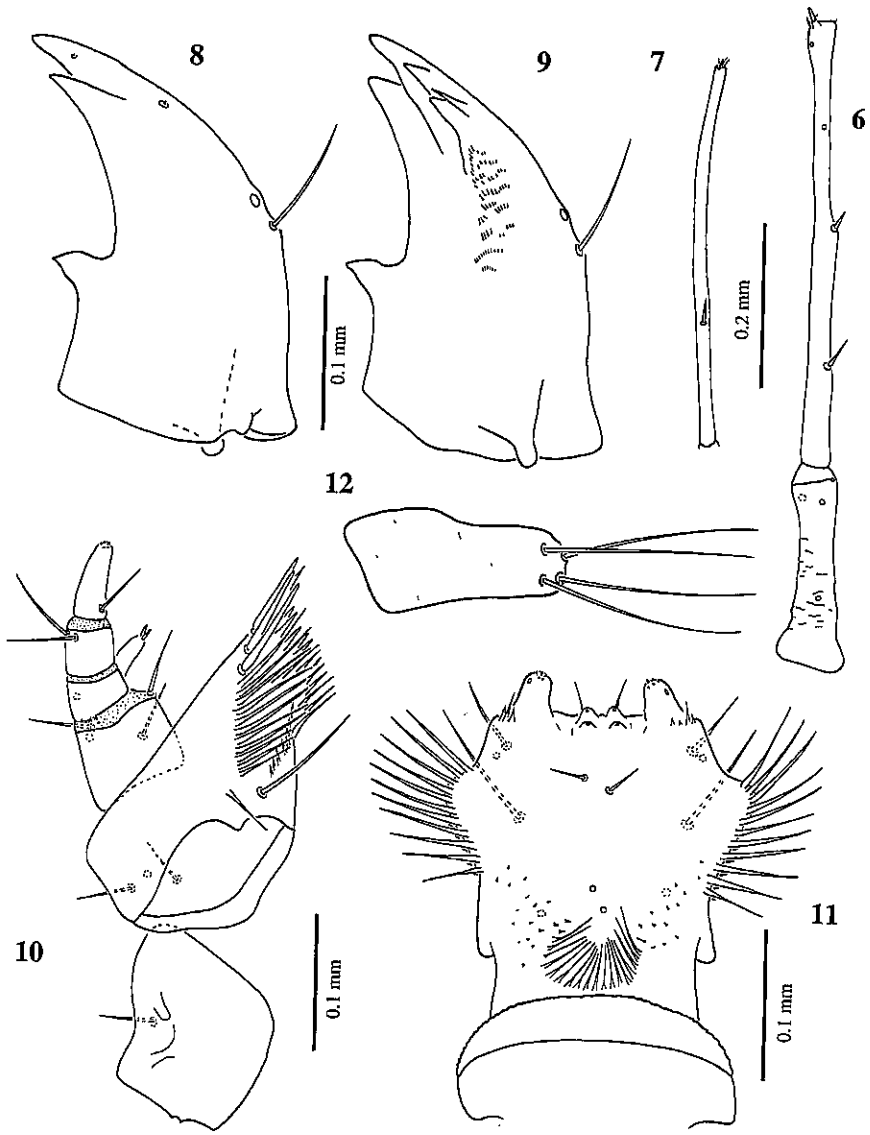

Plate II. *Spercheus halophilus* n. sp., larvae. Fig. 6. Third instar larva, left antenna, dorsal view segments 1–2. Fig. 7. Same, segment 3. Fig. 8. Third instar larva, right mandible, dorsal view. Fig. 9. Third instar larva, left mandible, ventral view. Fig. 10. Third instar larva, left maxilla, dorsal view. Fig. 11. Third instar larva, labium, dorsal view. Fig. 12. First instar larva, fingerlike appendage of abdominal segment 7, lateral view.

halophilus n. sp. the labroclypeus is rounded in the corners, while in the other two species it is more sharply angulate. The mandibles of *S. halophilus* n. sp. are wider, bifid in the apex, but with several ventral toothlets, these toothlets are absent in the other two species; *S. halophilus* n. sp. lacks the longitudinal row of ventral spines present in the other two species. The antennae of *S. halophilus* n. sp. are very long, two times or more the length of the headcapsule, in the other two species the length is similar to that of the headcapsule. The labium of *S. halophilus* n. sp. shows a reduced ligula, the ligula is well developed in *S. emarginatus* and *S. cerisyi*; the labial palps in *S. emarginatus* and *S. cerisyi* are two-segmented (the basal segment is fused to the prementomentum but still visible), while they are one-segmented in *S. halophilus* n. sp. (the basal segment is reduced). Finally the fingerlike projection present in larvae of *S. halophilus* n. sp. is absent in the other two species; *S. emarginatus* first instar larvae show two small, eversible, sclerotized lobes (in the same position of the fleshy lobes of *S. halophilus* n. sp., probably homologous), *S. cerisyi* third instars show a pair of small sclerotized plates with a few setae each on the same position.

Finally, the way the egg case of *S. halophilus* n. sp. is attached to the hindlegs is different since the legs are actually embedded in it; in *S. emarginatus* the egg case is loose and can be easily dropped by the female.

Biological observations

Very little is known on the biology of this genus, some descriptive works are those of Cussac (1852), Fowler (1882), Schlick (1887), and Böving and Henriksen (1938). All these are based on the European species *S. emarginatus*. What

follows are some observations, made in the laboratory, on both adults and larvae of *S. halophilus* n. sp.

Adults live among the emergent vegetation or on the margins of temporary pools of salty water, under different substrates such as small rocks, plant debris, etc. They spend most of the day hiding and move very slowly along the substrate and, as *S. emarginatus*, they can walk on the underside of the water's surface. They use their antennae to accomplish the gas exchange; this is described in detail for *S. emarginatus* (Hrbácek, 1950). The adults have a ventral plastron that covers the thoracic surfaces, but does not extend into the abdominal sternites. They feed on plant material and decaying organic matter, in the laboratory they were fed successfully with fish food flakes. Studies by Rothmeier and Jäch (1986), with adults of *S. emarginatus* and *S. cerisyi*, describe these two species as capable of grazing and also filtering at the water's surface.

Females with egg cases are more active, walking on small sticks most of the time, staying close to the waters' surface. The egg case swells as the embryos develop, and it projects past the elytral margins halfway through the embryonic development. The egg case is kept in place by the hind legs, which are completely embedded into the silk mesh from trochanter to tarsus, and are useless for walking. This means that all locomotion is accomplished with the front and middle legs. Once the larvae hatch the female drops the empty egg case and resumes her secretive life. Embryonic development is fast, about 4–5 days at the most.

Larvae are sluggish too, staying close to the surface and can walk on the underside of the waters' surface, as the adults do. All instars have a small abdominal fingerlike appendage that aids them in locomotion, but it is more frequently used by first instars; they use it to adhere to the substrate, including the waters' surface. This appendage has not been reported from other hydrophiloid larvae.

All instars fed on algae and detritus from the substrate, none were seen feeding on live prey but they did eat dead prey. *Spercheus* larvae have a very well developed proventriculus, with strong teeth, that probably helps to break down the detritus they consume. This proventriculus is another characteristic of the family and is described and illustrated by Beutel (1999). Survivorship under laboratory conditions was poor, so further studies are necessary to establish food preferences more precisely. *S. emarginatus* has been reported to feed on drifting organic remains, flies and particles of lung (Böving & Henriksen, 1938) and also as being cannibalistic (Fowler, 1882). This information suggests that these larvae can be opportunistic but further behavioral studies are needed.

Development is apparently fast, first instars lasted 4–6 days, and second instars 6–7 days. Pupation did not take place so the duration of the last larval instar is unknown.

Acknowledgements

I thank A. O. Bachmann for examining the specimens of the new species and lending me specimens of *Spercheus fimbricollis*, deposited at the Argentine Museum of Natural Sciences. I also thank M. Toledo and P. J. Spangler for the material of *S. emarginatus* and *S. cerisyi* used for the comparative notes.

References

Archangelsky M (1997): Studies on the Biology, Ecology, and Systematics of the Immature Stages of New World Hydrophiloidea (Coleoptera: Staphyliniformia). *Ohio Biological Survey Bulletin New Series 12*: ix + 207.

Beutel RG (1999): Morphology and evolution of the larval head of Hydrophiloidea and Histeroidea (Coleoptera: Staphyliniformia). *Tijdschr Entomol 142*: 9–30.

Böving AG, Henriksen KL (1938): The developmental stages of the Danish Hydrophilidae. *Vidensk Medd fra Dansk naturh Foren 102*: 27–162.

Bruch C (1915): Nuevas especies de Coleópteros Hidrofílidos. *Revta Mus La Plata 19*: 447–470.

Cussac E (1852): Moeurs et métamorphoses du *Spercheus emarginatus* et de l'*Helochares lividus*. *Annls Soc Ent Fr 10*: 617–627, Pl. XII.

Fernández LA, Bachmann AO (1998): Hydrophiloidea. In: Morrone JJ, Coscarón S, eds., *Biodiversidad de artrópodos Argentinos*. Ediciones Sur, La Plata, Argentina, pp. 218–226.

Fowler C (1882): A contribution to the life-history of *Spercheus emarginatus*. *Entomol Month Mag 19*: 79–82.

Hansen M (1991): The hydrophiloid beetles: Phylogeny, classification and a revision of the genera (Coleoptera, Hydrophiloidea). *Biologiske Skrifter, Kongelige Danske Videnskabernes Selskab 40*: 1–367.

Hebauer F (1997): Revision der Arten der Familie Spercheidae Erichson, 1837 (Coleoptera, Hydrophiloidea). *Entomologische Blätter 93*: 9–42.

Hebauer F (1999): *Spercheus wattsi* sp. n. – a second Australian species of the genus (Coleoptera, Hydrophiloidea). *Acta Coleopterologica 15*: 5–6.

Hrbácek J (1950): On the morphology and function of the antennae of the central european Hydrophilidae (Coleoptera). *Trans Roy Entomol Soc Lond 101*: 239–256.

Reichardt H, Vanin SA, Spangler PJ (1975): New and little known Neotropical Coleoptera IV. Notes on Spercheidae, especially *Spercheus fimbriicollis* Bruch. *Papéis Avulsos de Zoologia 29*: 71–78.

Rothmeier G, Jäch MA (1986). Spercheidae, the only filter-feeders among Coleoptera. *Proceedings of the 3rd European Congress of Entomology (Amsterdam)*, pp. 133–137.

Schlick W (1887): Yngleforhold hos *Spercheus emarginatus*. *Entom Medd I 1887*: 26–27.

Trémouilles ER, Oliva A, Bachmann AO (1995): Insecta: Coleoptera. In: Lopretto EC, Tell G, eds., *Ecosistemas de Aguas Continentales, Metodologías para su Estudio*. Ediciones Sur, La Plata, Argentina, pp. 1133–1197.