Studies and reports of District Museum Prague-East
Taxonomical Series 4 (1-2): 267-276, 2008

On *Scydmaenus schwendingeri* sp. n. and its tegumental secretory structures (Coleoptera: Staphylinoidea: Scydmaenidae)

Stanislav VIT

26 Rue de la Poterie, 1202 Genève, Switzerland
e-mail: stanislav.vit@edu.ge.ch

Taxonomy, new species, femoral hypertrophy, pygidial modifications, secretory organs, Coleoptera, Scydmaenidae, *Scydmaenus*, Vietnam

Abstract. A new species *Scydmaenus schwendingeri* sp. n. is described from an evergreen rain forest in Vietnam. The species is characterized by sexual dimorphic hind femora exhibiting in male an adaptation to a secretory activity, and by yet unstudied secretory structures of the male terminalia. Both features are described, illustrated and commented.

INTRODUCTION

In Scydmaenidae, family of Staphylinoid Coleoptera containing about 4700 described species, cuticular glandular systems, secretive organs, and their functions are poorly known. They are only supposed, mostly always there where such marked cuticular and structural, non standardized modifications, or some „anomalous“ morphological features have been observed on different parts of the body as: head, antennae, elytra, legs, abdominal segments. But nothing is known about the function of these exosceletal particularities (sensory, secretory, other) and the phyletic value of these features within the family remains undiscussed.
Nevertheless, these exosceletal particularities are exhibited generally only in male (apical elytral foveae in *Neuraphes* Thomson, 1859 and *Scydmoraphes* Reitter, 1891; modified antennomeres in *Euconnus* (*Cladoconnus*) Reitter, 1909 *Euconnus* (*Neonapochus*) Machulka, 1929 or *Oneila* Péringuey, 1899 femoral particularities in *Scydmaenus* Latreille, 1802 cranial cavities in *Scydmaenus* (*Cholerus*) Thomson, 1859; and which were often formally reported as characters of inter-and infrageneric taxonomic value.

RESULTS

Scydmaenus schwendingeri sp. n.
(Figs 1-12)

Type material. Holotype (♂): VIETNAM, Lam Dong Prov., road Da Hoa (= Da Huoai) - Bao Loc, ca. 13 km SW of Bao Loc. 11° 27´19.8´´N 107° 43´03.8´´E, 690 m. (evergreen rain forest), 31.viii. 2003, P. Schwendinger; SV - 03/17/ (Museum d´Histoire naturelle, Genève, Switzerland); paratype (♀): the same data as holotype (Museum d´Histoire naturelle, Genève, Switzerland).

Description. Body length 1.20-1. 27 mm, body width 0.45-0.50 mm (female being smaller), pronotum cordiform, distinctly less basally than head colour medium reddish-brown; integument glossy; dorsum of the pronotum densely, pronotal base roughly punctate; prebasal pits nearly indistinct; setae short, recumbent; male matafemora markedly hypertrophied (Fig. 1), housing some unknown and unstudied secretory functions.

Head subquadrate, moderately convex, finely punctate and setose, wider than long, ratio 0.77 (male), 0.75 (female), not as wide as pronotum but wider than pronotal base; supra-antennal prominences obliterated; frons abruptly connected to clypeus; vertex slightly convex; tempora arched, posterior angles obliterated; occipital edge simple, provided with minute median carina; eyes moderately large, shorter than tempora; tempora (laterally) 1.5 times longer than eyes.

Antennae slightly longer than combined length of head and pronotum, ratio 1.17 (male), 1.15 (female) and distinctly longer than combined width of elytra; antennomeres 4-11 finely bordered basally; 3-segmented antennal club as long as antennomeres 3-8 combined; apical antennomere about twice longer than wide, and slightly shorter than two following ones combined; antennomere 10 subcylindric; antennomere 9 subspherical; antennomeres 8 and 7 markedly reduced, slightly asymmetrical, subquadrate, both combined as long as antennomere 5, antennomere 6 oblong; antennomeres 3-5 elongate, subequal, except for the more elongate segment 5, which is about twice as long as wide; pedicel distinctly shorter than scape, twice as long as wide; scape about twice as long as wide.

Pronotum elongate, cordiform, its biggest width on its anterior third, ratio 1.12 (male), 1.13 (female); dorsum provided with dense, nearly rough punctures and recumbent setae; base coarsely, roughly punctate, bearing four nearly indistinct prebasal pits.

Elytra rather short fairly convex and rounded laterally, longer than wide, elytron lenght to pronotal length ratio 1.28 (male); elytron length to head plus pronotal lengths combined ratio ratio E.L./ co.L.H.P.: 1.13 (male), 1.09 (female); humeri and basal parahumeral depression subobliterated; basal foveae none; scutellar ridge obliterated; sutural edge simple; apical edge of each elytron rounded separately; integument of elytra provided with dense and subobliterated punctures and rather short recumbent setae directed longitudinally. Sides of the elytra facing the metafemora free of any peculiar character.

Venter densely punctuate and densely pubescent. Metepisterna relatively narrow, glabrous, entirely separated from metasternum, but seated very laterally and at least partly hidden ventrally by lower lateral edge of the elytra; metasternum strongly convex, large, longer than all abdominal segments combined, apical edge slightly depressed medially (in male), the depressed area provided with a patch of short setae; mesosternal lamina progressively raised, coarsely granulate, free of median furrow, forming sharp angle at its connection with metasternum.

Legs rather slender (exception made for the strongly modified male hind femora), pro- and mesotibiae straight, not swollen in the middle, pro- and mesofemora not markedly clavate; mesotibia distinctly shorter than metatibia and slightly shorter than matatarsi in male, setose. Hind legs significantly modified in male (Figs 1-3), metatrochanters fairly enlarged but flattened dorsoventrally, twice as long as interval separating the metacoxal cavities and exceeding in length the sides of the body (Figs 1-2); male metafemora strongly

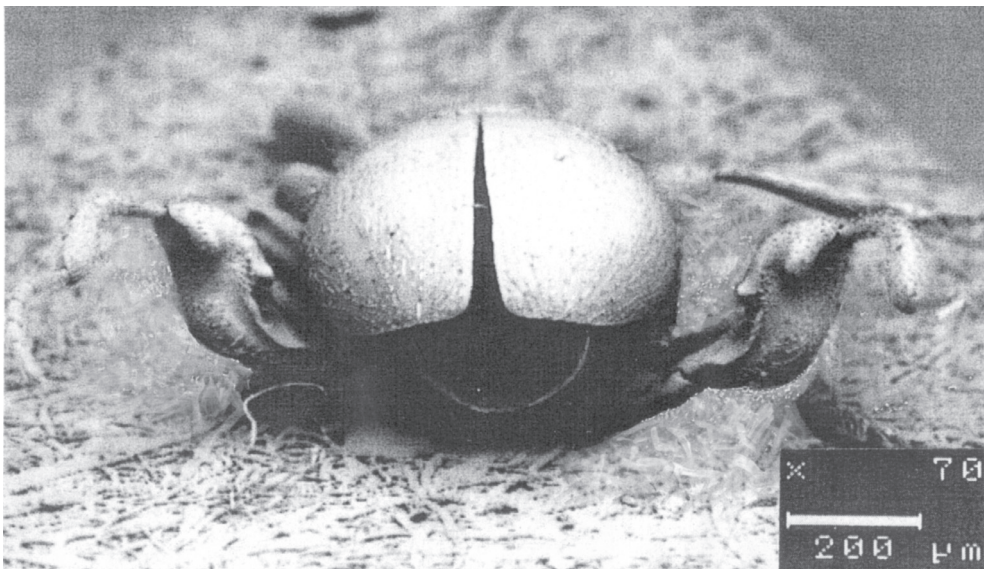


Fig. 1. *Scydmaenus schwendingeri* sp. n. - habitus (apico-axial aspect). Scale given in microns

inflated, chicken leg-like (Fig. 3), outer (or posteroventral) face strongly convex, the inner one (that facing the sides of elytra) provided with a large and deep funnel-shaped femoral cavity crowned by quadrate, concave and somewhat spoon-like prominence (Figs 3-4) provided with cribriforme pores and secretory patches (Figs 5-6) which indicate a glandular structures beneath the cuticle; male metatibia strongly arched and progressively thickened (Fig. 12). In the holotype, both femoral funnel-like cavities, exhibiti a layer of solid secretory product (Figs 3, 4) (not studied), which can indicate a possible independent secretory activity, hypothesis supported by the hypertrophic aspect of the outer, strongly convex face of the femur (Fig. 3).

Abdominal segments. Tergum of the male pygidium (Pg in Figs 10-11) subdivided or stratified horizontally in three levels (see Discussion), of which the intercalary cavities are provided with complex setose and foveal structures; last sternite bilobate. Abdominal segments simple in female.

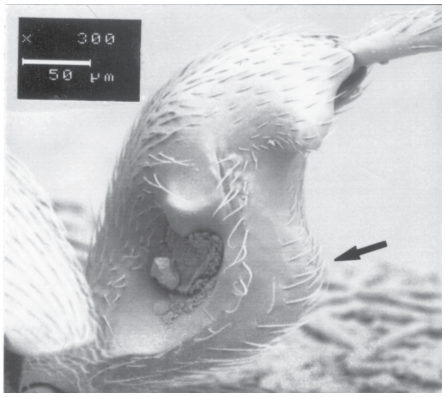
Aedeagus as in Figs 7-8, length about 0, 37 mm, open apically, produced into wide apical blade free of setae; median lobe absent; internal sac provided distally with a pair of sclerotized, permanently everted appendages.

Spermatheca (Fig. 9) minute, elongate, length under 0.2 mm.

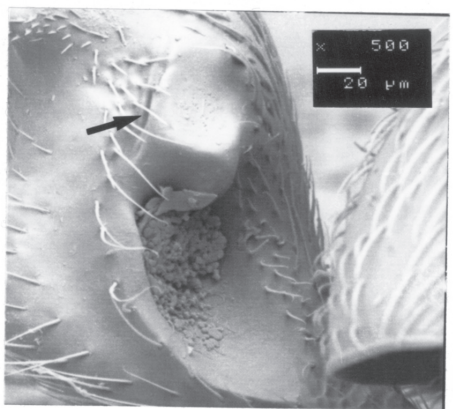
Distribution. Vietnam. Known only from the type-locality.

Remarks. The unique male specimen does not allow an exhaustive study of the femoral or abdominal structures and nothing is known about the biology of the species. Nevertheless a very speculative interpretation, derived from only mechanical characteristics of these structures is tempted, suggesting a hypothetical use of the femoral particularities (see Discussion).

2



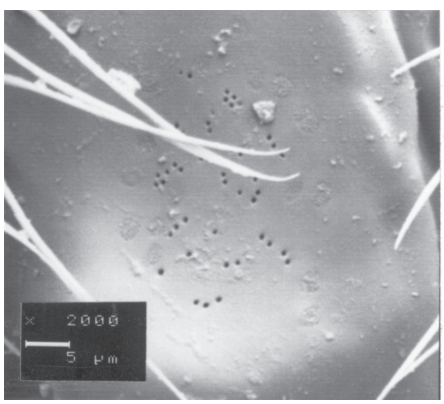
3

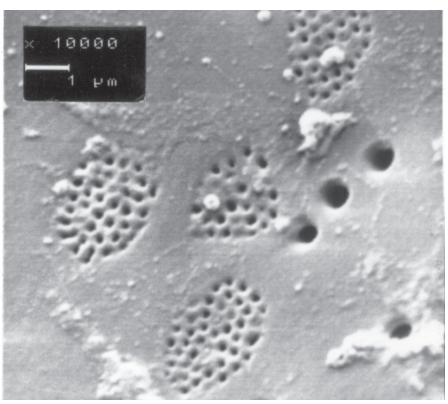


4

5

6





Figs 2-6. *Scydmaenus schwendingeri* sp. n. - metafemoral tegumental particularities. 2- right hind leg; 3- right metafemur (inner or dorsal aspect); 4- left metafemur, funnel-like femoral cavity (showing an accumulation of secreted substances) and upper secretory area; 5- right metafemur, upper secretory area; 6- idem, tegumental patches and pores. Scale given in microns.

Name derivation. Species dedicated to Dr. Peter Schwendinger (Genève), collector of this highly interesting species, and one of important contributors to the Genève Museum collections.

DISCUSSION

The purpose of this paper is to call merely attention to this poorly documented or hitherto neglected morphological features encountered in Scydmaenidae. Corollarily, also to make conspicous the fragility of the previous generic approaches in Scydmaenidae, in the present case the current concept of the genus group *Scydmaenus* Latreille and the subgeneric treatment of the genus (e.g. *Armatoscydmaenus* Franz, 1971 *Mescarensia* Franz, 1973). As the single male of *S. schwendingeri* sp. n. gives no opportunity to study extensively the features encountered in this oriental species: (femoral modifications, modifications on the male terminalia, secretory structures, aedeagus), the diagnosed features require at least some preliminary comments. Also the simultaneous occurrence of the femoral and abdominal modifications in both oriental species commented further would need more data related to the specific biology of this new species.

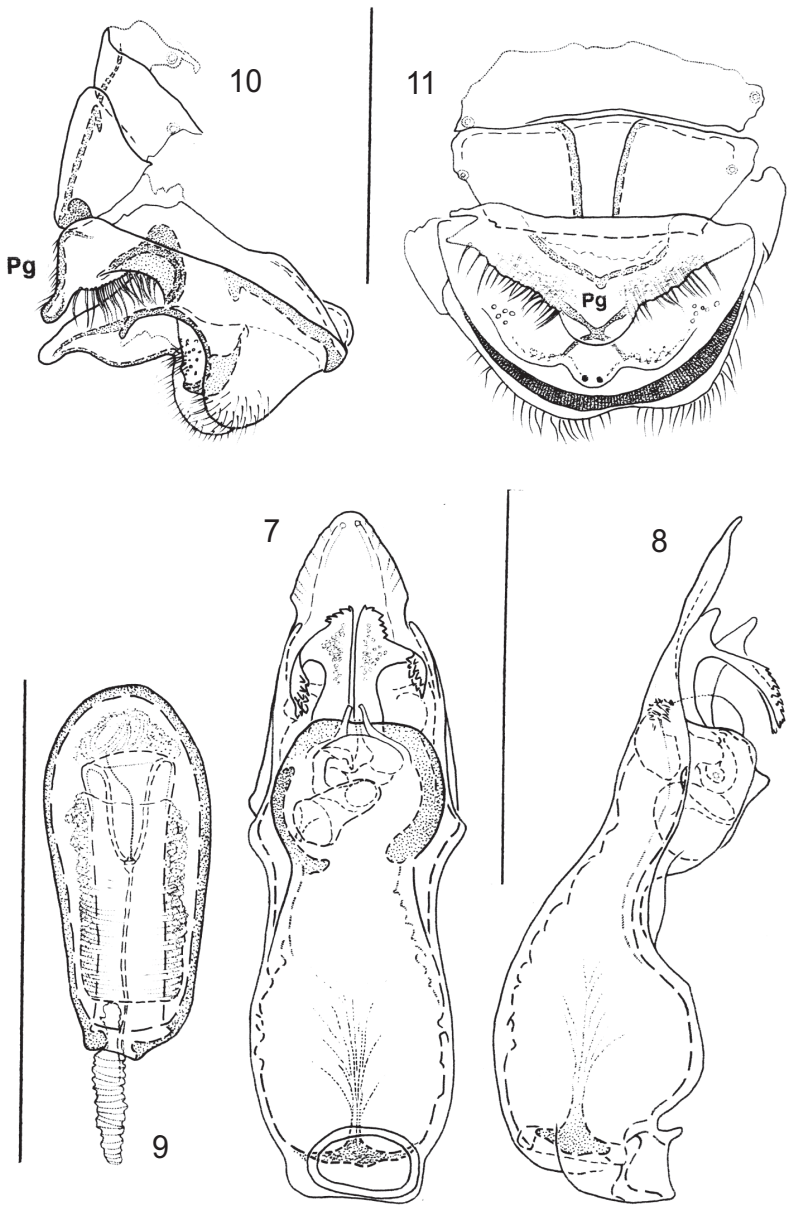
Comments. Femoral hypertrophy and secretory functions. The envolment of the metafemora for hitherto unstudied secretory structures is not unknown in *Scydmaenus*. Analogous modifications were still reported yet in several Afrotropical species, at least for: *Scydmaenus excavatifemur* Franz, 1980 in *S. tibiaedentatus* Franz, 1980 and possibly in *S. ivani* Franz, 1980. These features were neither studied nor figured. They were only simply keyed for *S. excavatifemur* as: „Hinterschenkel des ♂♂ distal stark verbreitert, auf der Innenseite mit einer grossen Hählung“ (Franz, 1980: 707).

Obviously, this trend is not peculiar to Afrotropical representatives of the genus and occurs also in Oriental species as *S. schwendingeri* sp. n., or, to a much reduced extent, in here commented and illustrated subpalaearctic *Scydmaenus* sp. from northern Pakistan (undescribed). In the latter, the basal half of matafemur is markedly bent, flattened, devoid of pubescence (Fig. 13) but free of tegumental structures; posterior edge of the femur (Figs 14-15) is provided with acute teeth (as in *Armatoscydmaenus* Franz, and the typical posterior femoral groove receiving the clamped tibia integrally conserved (Fig. 13). Cribriforme plates and secretory pores were not observed on the flattened inner face of the metafemur.

Which can be the use of the secretory areas in *S. schwendingeri* sp. n.? Based on the morphology of the hind leg as: convexity, concavity, protuberances, setation, respective lengths of the femur and tibia, arrow-like shape of the metatibia, and on their supposed mechanical relation, several speculative interpretations can be tempted.

1 - the upper, median, concave and spoon-like prominence on the dorsal face of the femur (Figs. 3-4), provided with secretory pores and circular cribriform plates (Figs 5-6), possesses manifestly a secretory activity, but being glabrous and free of any setose support this area can neither store nor retain its exudate (Fig. 4).

2 - the concavity of this secretory area follows the convexity of the elytra sides (Fig. 2) and seems to fulfil satisfactory mechanical conditions to rub on the exudate(s) on the sides of the elytra (or eventually be able to disperse its secretions on the lateral sides of the abdomen).



Figs 7-11. *Scydmaenus schwendingeri* sp. n.: 10,11- male terminalia in lateral (10) and dorsal (11) aspect; Pg - Pygidium; 7,9- copulatory organs: 7- aedeagus (tergal aspect); 8- aedeagus (lateral aspect); 9- spermatheca. Scale given: 0.2 mm.

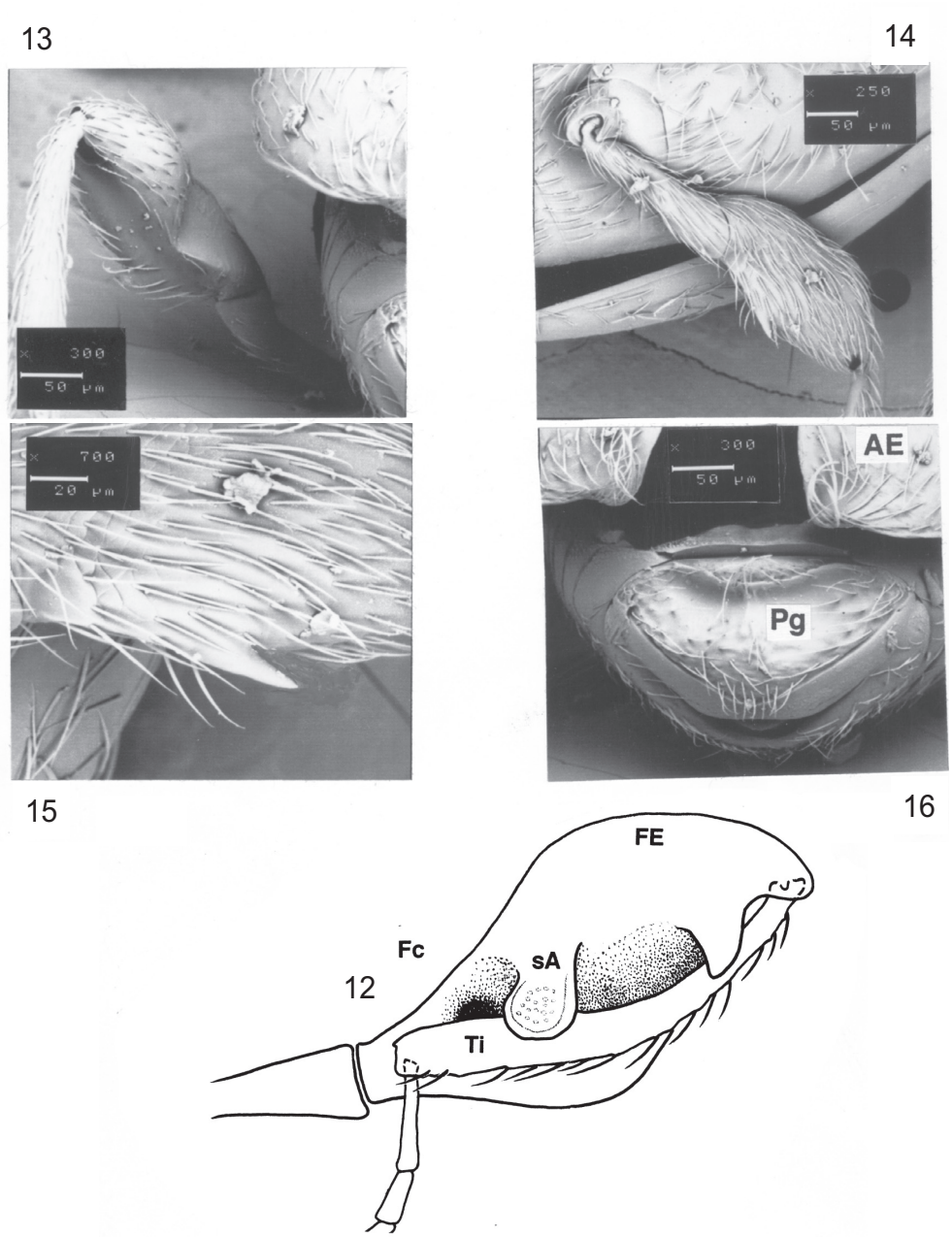


Fig. 12. *Scydmaenus schwendingeri* sp. n. - hypothetical association of clamped metatibia and metafemur (sketched free of scale). FE- femur; Fc-funel femoral cavity; sA- secretive area; Ti- tibia

Figs 13-16. *Scydmaenus* sp. (Pakistan). 13- left metafemur (inner or dorsal aspect): markedly bent and flattened in its basal half, devoid of pubescence and femoral cavity; 14- left metafemur (ventral aspect); 15- idem: posterior edge with prebasal femoral tooth; 16- apex of elytra and pygidium divided in three distinct area and showing a supplementary segmentation among the disc and apical edge. Pg- stratified male pygidium; AE- apical edge of elytra (with sutural peton of culled settae.

Actually, such hind leg motion ability (but not related to secretory functions!) was attested in unspecified Staphylinidae by Valentine (1973), in his study of Coleoptera grooming movements, under the categories 9: „Body-Hindleg Rub", and 16: „Bilateral Hindleg Rub".

Nevertheless, in *S. schwendingeri* sp. n., any supplementary setal or tegumental structures seating on the sides of the elytra or abdominal segments do not reinforce the hypothesis.

3 - still only mechanically: the same secretions can also just ooze down, into the lower, funnel-like femoral cavity, where these can be accumulated, stored or evaporated.

4 - but: the largely open femoral cavity of both femora keep (even on the dead specimen) heavily carried with exudate (Figs 3, 4) what suggests mostly its-own secretory activity, and such independent inner secretory structures (unstudied) are suggested also by the striking hypertrophy and significant swelling of the femoral trunk (Fig. 3).

5 - the dorso-apical obtuse teeth acts manifestly as locking structure of the tibia when clamped on/against the femur .

6 - the relative length and curved shape of the hind tibia fit that of the femur body and both can be associated in the way of clamped pocket-knife (Fig. 12).

7 - the clamped tibia can probably recover, at least partly, the femoral cavity and its secretory product, while the secretions of the femoral cavity can be eventually stored or protected by the tibial apex, but also transported on the ventro-apical area of the tibia (nevertheless any setal or tegumental structures on the tibia do not reinfoirce this hypothesis).

Sexually dimorphic terminalia. The male terminalia require discussion. Sexually dimorphic pygidium in *Scydmaenus* was reported yet in the last century by Sharp (1874) for *Scydmaenus reversus* Sharp, 1874 (Japan), where the tergum of the male pigydium shapes a prominent hump (unstudied). In *S. schwendingeri* sp. n. as well as in an undescribed Pakistanean *Scydmaenus* sp. (Figs 13-16), last visible abdominal tergite left exposed by the elytra proves more strikingly modified. In the latter the pygidium appears as subdivided in basal cavity, tergal disc and apical ring showing the modified tergum separated from its apical edge by a supplementary suture (Fig. 16). In *S. schwendingeri* sp. n. a complex stratified structure of the tergum could not be satisfactorily studied in the microscopic mount and its structure remains unclear. In Japanese *S. reversus* Sharp the hump of the pygidium recovers two, cavities of possibly secretive function. In *S. schwendingeri* sp. n. the pygidium houses some supplementary, probably secretory areas provided with setose structures.

Aedeagus of *S. schwendingeri* sp. n. (Figs 7-8) shows a very unusual organisation comparing to that encountred generally in *Scydmaenus* s. str. (where normally devoid of a well singularized sac interne or paired internal sclerites, but conserving a median ventral opening of the aedeagal tube, allowing a ventral evertion of the single, strongly sclerotized, asymmetrical piece median lobe?). In *S. schwendingeri*, the aedeagus sets up an intermediate link between generalized S-shaped aedeagus in *Scydmaenus* s. str. and that of *Cholerus* Thomson, 1859 or *Mescarensia* Franz, both latter characterized by extreme apical constriction of the aedeagal tube and its opening directed apically. In spite of only moderate contriction of the aedeagal tube in *S. schwendingeri* the aedeagal schema follows more clearly that of *Cholerus* in:

- aedeagal tube largely opened apically;
- apical blade dorsoventrally flattened and devoid of terminal setae;
- lacking a characteristic, unpaired, strongly sclerotized evertible structure (median lobe);
- exhibiting a well developed, symmetrical and paired sclerites reaching the structure of a „sac interne“

REFERENCES

Faustini D. L. & Halstead D. G. H. 1982: Setiferous structures of male Coleoptera. *Journal of Morphology* 173: 43-72.

Franz H. 1980: Scydmaenidae (Coleoptera) von der Elfenbeinküste, gesammelte von J. Decelle, Tervuren, und I. Löbl, genf. II. Gattungen *Microscydmus* Saulcy & Croiss. und *Scydmaenus* Latr. *Revue Suisse de Zoologie* 87: 671-709.

Sharp D. 1874: Pselaphidae and Scydmaenidae of Japan. *Transactions of the Entomological Society of London* 1874: 105-130.

Valentine B. D. 1973: Grooming behavior in Coleoptera. *The Coleopterists Bulletin* 27: 63 -73.