

Description of *Neolacunisoma geraldshmidti* gen. n., sp. n., (Acanthocephala: Centrorhynchidae) from South African Shorebirds

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ABSTRACT: *Neolacunisoma geraldshmidti* gen. n., sp. n. (Centrorhynchidae), is described from 7 species of shorebirds (Charadriiformes) in South Africa. Worms are spindle-shaped: proboscis globular anteriorly where it has 39–43 longitudinal rows of 9–11 rooted hooks per row and cylindrical posteriorly where it has 2–5 rootless spines per row; males with 2 preequatorial contiguous longer than wide testes and 3 tubular cement glands; females with subterminal gonopore and elongate ovoid sculptured eggs. The new genus is intermediate between the only 2 other genera of the family Centrorhynchidae, *Sphaerostris* Golvan, 1956, and *Centrorhynchus* Lühe, 1911. It is similar to the former genus in proboscis and trunk shape and size and to the latter in testes shape. Its lacunar system is intermediate between those of the 2 other genera combining the transverse pattern characteristic of *Centrorhynchus* and the dendritic pattern of *Sphaerostris*. The lacunar system pattern is one of the most important taxonomic characters in the classification of acanthocephalans. *Neolacunisoma* also has unique anteriorly prominent longitudinal riblike trunk muscles.

KEY WORDS: Acanthocephala, *Neolacunisoma geraldshmidti* gen. n., sp. n. (Centrorhynchidae), South African shorebirds.

Specimens of a centrorhynchid acanthocephalan collected from 7 species of shorebirds in South Africa proved to represent a new species of a new genus, raising the number of genera in this family to 3. This new taxon is described and compared with the 2 other genera, *Centrorhynchus* and *Sphaerostris*.

Materials and Methods

Thirty-seven individuals (16 males and 21 females) of a new centrorhynchid acanthocephalan were recovered from 7 species of shorebirds (Charadriiformes) collected from Berg River, Cape Province, South Africa, between May 24 and July 31, 1981. Host species are curlew sandpiper, *Calidris ferruginea* (Pontoppidan, 1763) (1 specimen); white-fronted sand plover, *Charadrius marginatus* Vieillot, 1818 (3); chestnut-branded plover, *Charadrius pallidus* (Strickland, 1852) (1); Kittlitz's plover, *Charadrius pecuarius* (Temminck, 1823) (9); triple-banded plover, *Charadrius tricoloris* Vieillot, 1818) (14); stilt, *Himantopus himantopus* (Linnaeus, 1758) (6); and black-smith plover, *Hoplopterus armatus* (Burchell, 1822) (3).

Specimens were collected by Al Canaris and processed by the late Gerald Schmidt, who apparently intended to describe them. We do not know the processing method used. The specimens were properly extended with everted proboscides, but the mounting medium has undergone some changes in a few slides.

Measurements are in micrometers unless otherwise stated. The range is followed by mean values (in parentheses). Width measurements refer to maximum

width. Specimens are deposited in the United States National Parasite Collection (USNPC), Beltsville, Maryland (Dr. J. R. Lichtenfels, Curator).

Results

A new centrorhynchid genus, intermediate between the only 2 other genera of family Centrorhynchidae Van Cleave, 1916, *Centrorhynchus* Lühe, 1911, and *Sphaerostris* Golvan, 1956, is recognized from South African shorebirds and described here.

Neolacunisoma gen. n.

Diagnosis

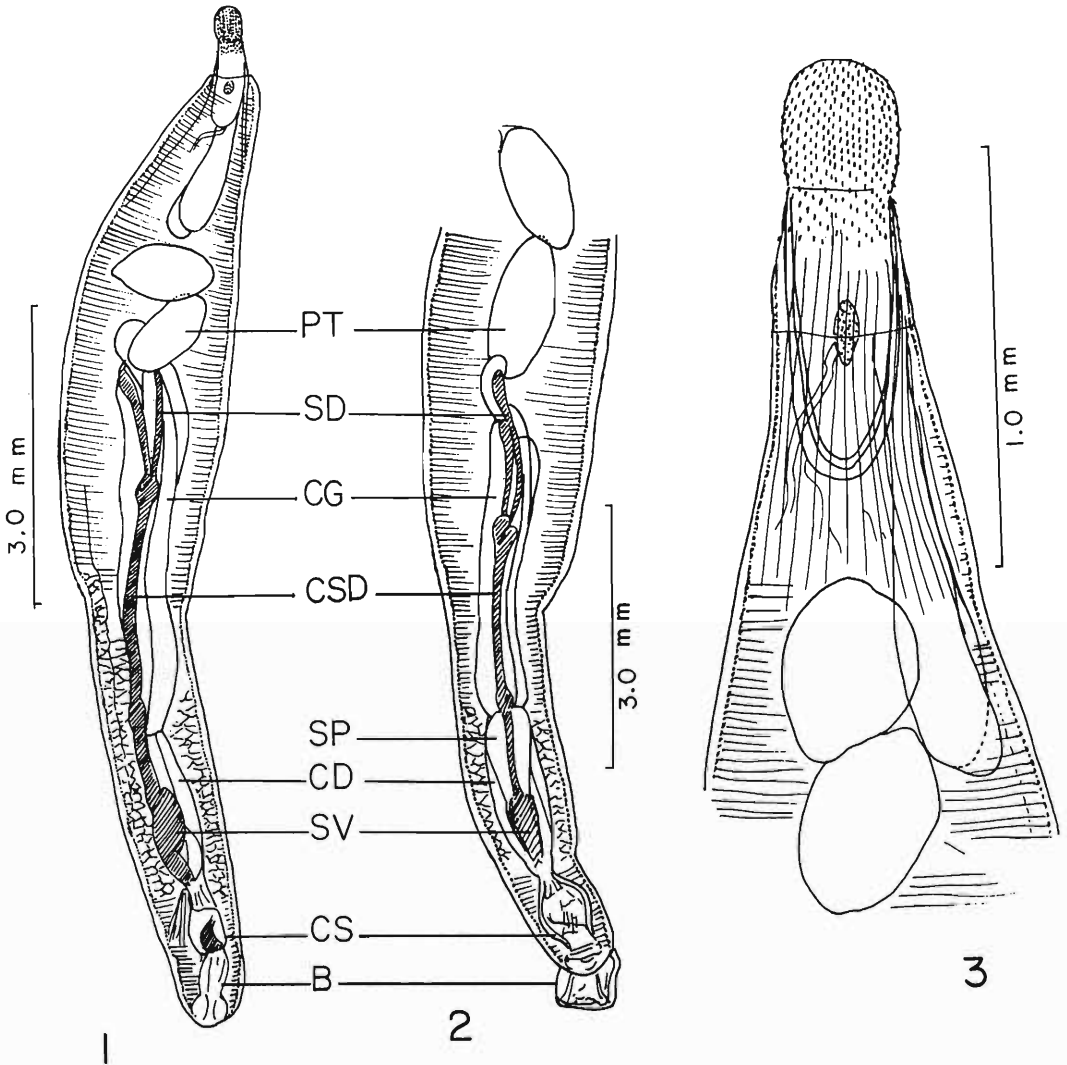
Centrorhynchidae. Trunk fusiform, small–medium in length, with longitudinal ribbed muscles most prominent anteriorly, and with transverse secondary lacunar canals anteriorly, and mostly laterally dendritic lacunar anastomoses posteriorly. Proboscis globular anteriorly with rooted hooks, and cylindrical posteriorly with spines. Neck prominent. Brain at middle of proboscis receptacle. Lemnisci markedly longer than proboscis receptacle. Testes longer than wide in anterior third of trunk. Cement glands 3, tubular. Eggs elongate-ovoid with transverse sculpturing.

Neolacunisoma geraldshmidti sp. n. (Figs. 1–9)

Description

GENERAL: Centrorhynchidae. Shared structures larger in females than in males. Trunk

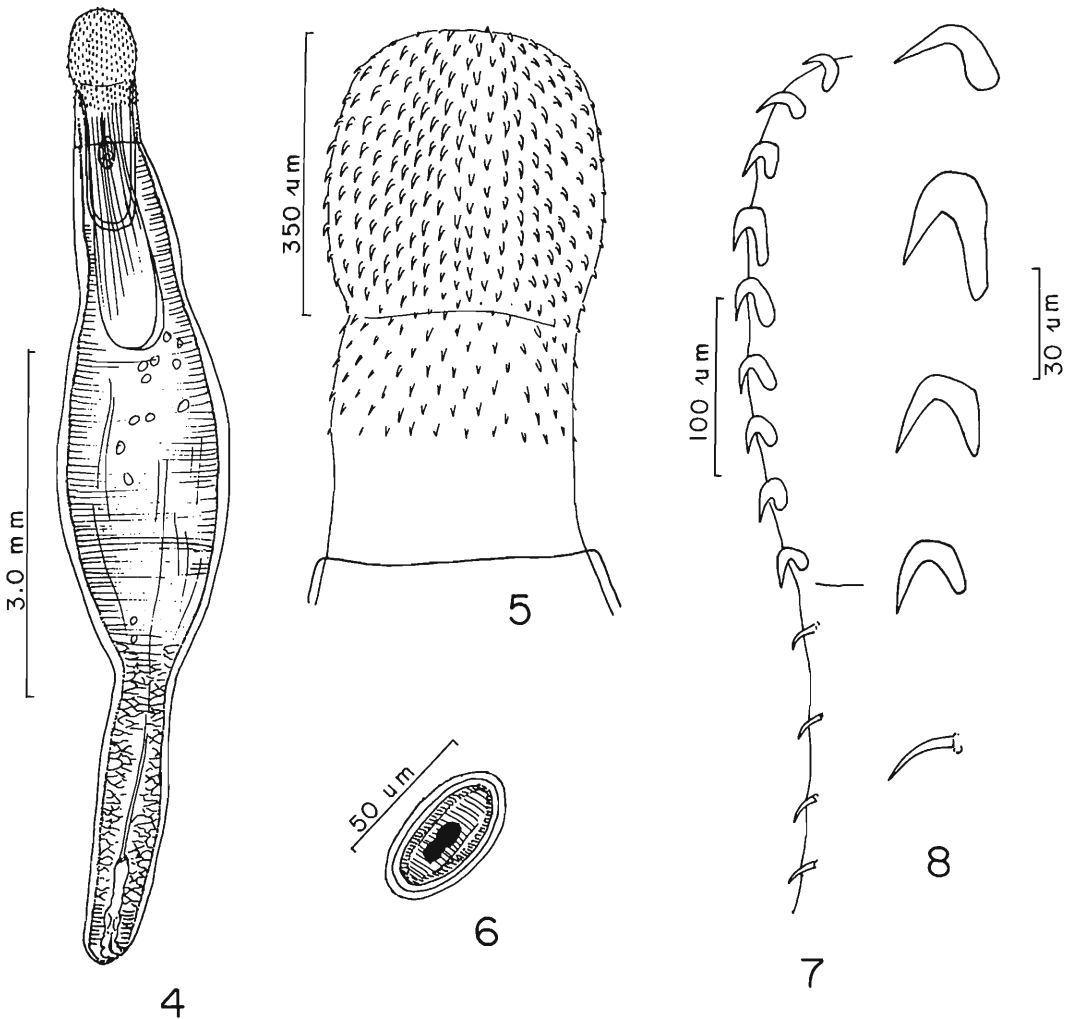
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Figures 1–3. *Neolacunisoma geraldshmidtii* gen. n., sp. n. 1. Holotype male, profile. 2. Ventral view of reproductive system of a paratype male. Abbreviations: B = bursa, CD = cement duct, CG = cement gland, CS = cirrus sac, CSD = common sperm duct, PT = posterior testis, SD = sperm duct, SP = Saeftigen’s pouch, SV = sperm vesicle. 3. Anterior end of a paratype male showing the relationship between the size and shape of proboscis, neck, proboscis receptacle, and lemnisci as well as the anterior riblike trunk muscles. Lacunar vessels are not shown where they overlap organs or other structures.

small–medium in size, spindle-shaped, more acutely so in younger than in older specimens with posterior part more narrow and cylindrical (Fig. 4). Longitudinal ribbed muscles along trunk contour particularly prominent anteriorly. Secondary lacunar vessels transverse in anterior 2/3 of trunk, anastomosing dendritically laterally in the posterior cylindrical 1/3 except for a short distance at the posteriormost end where the pat-

tern becomes transverse again (Figs. 1–4, 9). Proboscis variably globular anteriorly and cylindrical posteriorly as it slightly widens into the neck (Figs. 3–5). Proboscis with 39–43 hook rows each with 9–11 rooted hooks in anterior globular part and 2–5 rootless spines in posterior part. Proboscis hooks and spines not considerably different in length; anteriormost hooks smallest, 4th and 5th hooks largest, more pos-



Figures 4-8. *Neolacunisoma geraldshmidti* gen. n., sp. n. 4. Young allotype female. Lacunar vessels are not shown when they overlap organs or other structures. 5. Proboscis of allotype female. 6. Egg from a paratype female. 7. Lateral view of a complete row of proboscis hooks and spines of a paratype male. 8. Lateral view of enlarged proboscis hooks Nos. 1, 4, 7, and 9 and a spine of a paratype male.

terior hooks gradually decrease in size to that of posterior spines. All hook roots simple and directed posteriorly; those of anterior hooks markedly longer than blades, but gradually decrease in size to become about as long as blades of posteriormost hooks (Figs. 7, 8). Neck marked, widest posteriorly, and slightly wider than both parts of the proboscis. Double-walled proboscis receptacle slightly longer than proboscis and neck together, but shorter than subequal saciform lemnisci (Fig. 3). Brain at middle of proboscis receptacle where it is widest (Fig. 3).

MALES (based on 12 specimens): Trunk

2.808-9.516 (5.328) mm long by 0.686-1.654 (1.037) mm wide at dilation. Proboscis 444-572 (506) long; anterior part 279-343 (311) long by 178-317 (267) wide at middle dilation; posterior part 152-254 (195) long by 191-343 (272) wide at junction with neck. Proboscis with 39-42 (40.5) longitudinal rows of 9-11 (9.6) rooted hooks in anterior part and 4-5 (4.3) rootless spines in posterior part; a total of 13-16 (14.0) hooks and spines per row. Blades of rooted hooks measure from anterior 22-32 (25), 26-32 (28), 29-32 (30), 32-35 (32), 29-35 (31), 26-32 (28), 22-29 (25), 19-32 (24), 22-29 (24);

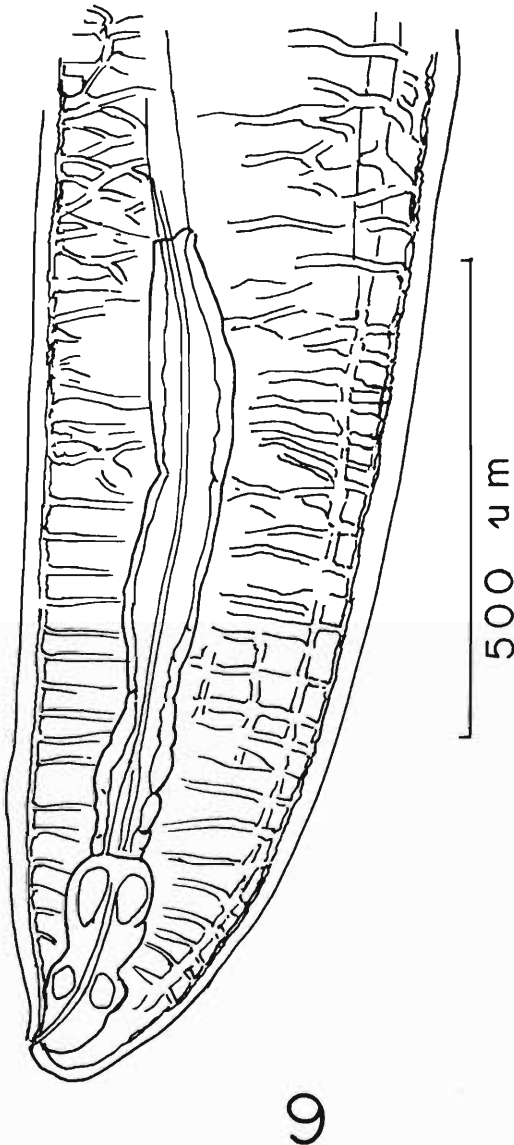


Figure 9. *Neolacunisoma geraldshmidti* gen. n., sp. n. Reproductive system of a paratype female.

spines 19–29 (24), 22–29 (24), 22–26 (24), 22–29 (26) long. Neck 102–254 (142) long by 216–368 (295) wide at base. Proboscis receptacle 571–889 (730) long and 190–317 (257) wide at middle. Lemnisci usually extend past anterior testis but may reach middle of posterior testis (Fig. 3), subequal, the longer lemniscus 1.016–1.651 (1.311) mm long by 114–419 (251) wide, the shorter 0.889–1.587 (1.251) long by 190–444 (232) wide. Testes about equal in size, rel-

atively large, markedly longer than wide, tapering into rounded poles, and usually obliquely contiguous (Figs. 1–3). Anterior testis 343–927 (585) long by 203–559 (363) wide; posterior testis 356–952 (587) long by 216–508 (341) wide. Two independent sperm ducts join in an anteriorly dilated common sperm duct that develops into a distinct sperm vesicle overlapping Saeftigen's pouch posteriorly. Cement glands 3, tubular, of different lengths, all connect with corresponding cement ducts with a constriction at same level posteriorly but originate at different levels anteriorly; the first begins near middle of posterior testis, the second just posterior to that testis, and the third just behind the latter. Longest cement gland 0.825–4.127 (2.333) mm long by 51–279 (174) wide, shortest 0.825–3.810 (2.021) long by 38–343 (155) wide. Cement ducts tubular, similar in appearance to cement glands, 0.444–1.460 (1.101) mm long by 51–254 (127) wide. Saeftigen's pouch pear-shaped 0.483–1.397 (0.786) long by 127–508 (265) wide anteriorly, widest anteriorly at level of junction between cement glands and ducts and connects posteriorly with the posterior end of cement ducts and with that of the sperm vesicle (Figs. 1, 2). Gonopore terminal.

FEMALES (based on 12 specimens, 8 gravid):

Trunk 4.867–16.224 (11.041) mm long by 0.967–3.432 (1.585) mm wide at dilation. Proboscis 508–635 (586) long; anterior part 317–381 (350) long by 241–330 (295) wide at middle dilation; posterior part 178–279 (237) long by 254–394 wide at junction with neck. Proboscis with 40–43 (41.4) longitudinal rows of 9–10 (9.7) rooted hooks in anterior part and 2–5 (3.2) rootless spines in posterior part; a total of 12–15 (13.1) hooks and spines per row. Blades of rooted hooks measure from anterior 22–32 (26), 26–32 (29), 29–38 (32), 32–38 (35), 32–38 (34), 29–38 (33), 26–32 (28), 26–29 (27), 22–29 (26), 22–29 (26); spines 22–26 (24), 22–29 (26), 22–29 (26), 24–32 (28) long. Neck 165–317 (217) long by 279–483 (367) wide at base. Proboscis receptacle 0.787–1.041 (0.888) mm long by 229–330 (283) wide at middle. Longer lemniscus 1.333–1.778 (1.524) mm long by 216–381 (279) wide, the shorter 1.270–1.524 (1.397) mm long by 190–381 (267) wide. Reproductive system (Figs. 4, 9) 0.780–1.997 (1.242) mm long; 8.9–18.7% (14.0%) of trunk length. Highest percent values invariably in smallest nongravid females, and lowest values in larger worms that

Table 1. Diagnostic features of the 3 genera of the family Centrorhynchidae.

	<i>Sphaerostris</i> Golvan, 1956	<i>Centrorhynchus</i> Lühe, 1911	<i>Neolacunisoma</i> Amin and Canaris (this paper)
Trunk	Short, spindle-shaped	Long, cylindrical, with mild anterior dilation	Short-medium, spindle-shaped
Longitudinal trunk muscles	?	?	Prominent anteriorly
Lacunar system	Secondary vessels anastomose in a dendritic pattern	Secondary vessels with transverse anastomoses	Anastomoses transverse anteriorly and mostly dendritic posteriorly
Proboscis	Short, anterior part globular (widest at middle), posterior part somewhat cylindrical	Long, anterior part dilated posteriorly (at insertion of proboscis receptacle), posterior part almost cylindrical	Short, anterior part globular (widest at middle), posterior part somewhat cylindrical
Testes	Spheroid, often large	Markedly longer than wide	Markedly longer than wide, large
Cement glands	Tubular, long, 3-4	Tubular, very long, 3-4	Tubular, long, 3

apparently continued to grow after the reproductive system has reached its maximum size. Gonopore subterminal (Fig. 9). Eggs sculptured with transverse lines, elongate-ovoid without prolongation of any membranes (Fig. 6) 48-61 (52) long by 19-26 (23) wide.

Taxonomic summary

TYPE HOST: Kittlitz's plover, *Charadrius pecuarius* (Temminck, 1823) (Caradriiformes).

OTHER HOSTS: Curlew sandpiper, *Calidris ferruginea* (Pontoppidan, 1763); white-fronted sand plover, *Charadrius marginatus* Vieillot, 1818; chestnut-banded plover, *Charadrius pallidus* Strickland, 1852; triple-banded plover, *Charadrius tricollaris* Vieillot, 1818; stilt, *Himantopus himantopus* (Linnaeus, 1758); blacksmith plover, *Hoplopterus armatus* (Burchell, 1822) (Caradriiformes).

SITE OF INFECTION: Intestine.

TYPE LOCALITY: Berg River, Cape Province, South Africa.

SPECIMENS DEPOSITED: USNPC No. 86954 (holotype male); No. 86955 (allotype female); Nos. 86956-86961 (paratypes).

ETYMOLOGY: The generic name is descriptive of the new pattern of its lacunar system intermediate between those of *Centrorhynchus* and *Sphaerostris*. The new species is named for the late Dr. Gerald D. Schmidt, who originally processed and intended to describe this material, for his substantial contributions to acanthocephalan taxonomy.

Remarks

Golvan (1956) divided the genus *Centrorhynchus* Lühe, 1911, into 2 subgenera *Longirostris* and *Sphaerostris* without type species designations. The first subgenus was preoccupied and was replaced by the subgenus *Centrorhynchus* in which all non-*Sphaerostris* centrorhynchids are placed.

Golvan's diagnosis of *Sphaerostris* involved the following characters: "corps de taille assez reduite, en form de fuseau large." "Proboscis court . . . portion anterieure globuleuse." "Testicules presque spherique et souvent volumineux." "3 . . . 4 glandes cementaires." "Vaisseaux de systeme lacunaire anastomoses en formant un reseau a mailles grossierement polydendrique" (Golvan, 1956). His figure 1 (p. 737) shows anastomosing "cells" that are markedly longer vertically than laterally. Members of his other subgenus, *Longirostris* (=genus *Centrorhynchus*) have "grande taille, de forme allongee . . . portion anterieure . . . dilatee, le reste du corps . . . pres regulierement cylindrique." "Proboscis assez long, avec une dilation mediane, que correspond au point d'insertion du receptacle du proboscis." "Testicules toujours plus longs que larges. Glandes cementaires . . . 3 . . . 4 . . . tubulaires, tres longues." "Vaisseaux secondaires du systeme lacunaire formant des anastomoses transverse . . ."

Distinguishing features separating *Neolacunisoma* from *Centrorhynchus* and *Sphaerostris* are summarized in Table 1. Basically, the new

genus is an intermediate taxon that has a *Sphaerirostris*-like trunk and proboscis shape but *Centrorhynchus*-like testes and a transverse lacunar pattern in its anterior $\frac{2}{3}$ of trunk and at its posteriormost end. The dendritic lacunar pattern characteristic of *Sphaerirostris* is present in the posterior trunk between the 2 transverse regions. The lacunar system pattern is one of the most important taxonomic criteria in the classification of acanthocephalan genera and higher taxa and represents a major justification for the erection of the new genus. Anteriorly prominent longitudinal ribbed muscles appear to be unique to *Neolacunisoma*. We are not sure whether any of the more than 25 described species of *Sphaerirostris* may share some of the preceding char-

acters of *Neolacunisoma* that may have been overlooked or not reported. A separate study of type material of the species of *Sphaerirostris* would resolve this question and may result in reassignment(s) to the new genus.

Acknowledgment

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Literature Cited

- Golvan, Y. J. 1956. Le Genre *Centrorhynchus* Lühe 1911 (Acanthocephala-Polymorphidae). Révision des espèces européennes et description d'une nouvelle espèce africaine parasite de rapace diurne. Bulletin de l'Institut français d'Afrique noire. Serie A, Sciences Naturelles 18:732-791.