

Description of *Xiphidorus achalae* n. sp. and proposal for a classification of longidorids (Nematoda : Dorylaimoidea)

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SUMMARY

The authors describe and illustrate a new longidorid, *Xiphidorus achalae* n. sp., from meadow soil, in Córdoba Prov., Argentina. This new species is characterized by its great body and stylet lengths, the presence of spines in the uterus and by the presence of two peculiar ventral pores near the level of nerve ring. Detailed observations on *Xiphidorus yepesara* Monteiro, 1976, type species of the genus, are reported. The authors propose an emended classification of the longidorids : they are considered as pertaining to a single family, Longidoridae Thorne, 1935, without subfamilies. The genera retained are : *Longidorus* Micoletzky, 1922, type genus, *Xiphinema* Cobb, 1913, *Paralongidorus* Siddiqi, Hooper & Khan, 1963, *Xiphidorus* Monteiro, 1976 and *Longidoroides* Khan, Chawla & Saha, 1978. *Siddiqia* Khan, Chawla & Saha, 1978 and *Inagrei* Khan, 1982 are considered as minor synonyms of *Paralongidorus* and *Longidoroides*, respectively. *Californidorus* Robbins & Weiner, 1978 is confirmed as pertaining to Nordiidae. *Brevinema* Stegarescu, 1980 is not taken into consideration. Emended diagnoses are provided for the family and genera.

RÉSUMÉ

Description de *Xiphidorus achalae* n. sp., et proposition d'une classification des Longidorides
(Nematoda : Dorylaimoidea)

Les auteurs décrivent et illustrent un nouveau Longidoride, *Xiphidorus achalae* n. sp., provenant de sol de prairie, Province de Córdoba, Argentine. Cette nouvelle espèce est caractérisée par la grande longueur du corps et du stylet, la présence d'épines dans l'utérus et celle de deux pores ventraux particuliers au niveau de l'anneau nerveux. Des observations détaillées concernant *Xiphidorus yepesara* Monteiro, 1976 sont rapportées. Les auteurs proposent une classification émondée des Longidorides : ceux-ci sont considérés comme constituant une seule famille, Longidoridae Thorne, 1935, sans sous-familles. Les genres retenus sont : *Longidorus* Micoletzky, 1922, *Xiphinema* Cobb, 1913, *Paralongidorus* Siddiqi, Hooper & Khan, 1963, *Xiphidorus* Monteiro, 1976 et *Longidoroides* Khan, Chawla & Saha, 1978. *Siddiqia* Khan, Chawla & Saha, 1978 et *Inagrei* Khan, 1982 sont considérés comme synonymes mineurs de *Paralongidorus* et *Longidoroides*, respectivement. *Californidorus* est confirmé appartenir aux Nordiidae. *Brevinema* Stegarescu, 1980 n'est pas pris en considération. Des diagnoses émondées sont proposées pour la famille et les genres.

During a nematological survey made by one of the authors (M.E.D.) at Pampa de Achala, Argentina, a nematode belonging to an undescribed species of the genus *Xiphidorus* Monteiro, 1976 (Longidoridae) has been observed. It is described below under the name *Xiphidorus achalae* n. sp. In addition a reappraisal of the genera of Longidoridae *sensu* Hopper & Southey, 1973 is presented which differs from the rearrangements proposed at generic, sub-family, and family levels in the Longidoroidea, as conceived by

Khan and Ahmad (1975) and Khan, Chawla and Saha (1978).

Material and methods

Specimens were separated from the soil by the centrifugal-flotation technique (Jenkins, 1964), killed and fixed with hot P4 : 1 (Netscher & Seinhorst, 1969) and mounted in dehydrated glycerine by the rapid method (Seinhorst, 1962).

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Xiphidorus achalae n. sp.

MEASUREMENTS

Females (n = 13) : L = 5.18 mm (4.78-6.33) ; a = 121 (104-130) ; b = 13.7 (9.5-15.8) ; tail = 27.5 μ m (24-32) ; c = 190 (169-222) ; c' = 1.0 (0.9-1.0) ; V = 43.1 (39.3-45.6) ; odontostyle = 111 μ m (106-120) ; odontophore = 52 μ m (49-59) ; stylet = 163 μ m (156-179).

Juveniles 4th stage (n = 4) : L = 3.62 mm (3.44-3.79) ; a = 106 (104-108) ; b = 11.6 (11.3-11.8) ; tail = 31.5 μ m (30-33) ; c = 115 (106-125) ; c' = 1.2 (1.2-1.3) ; odontostyle = 92 μ m (88-95) ; odontophore = 44 μ m (43-47) ; stylet = 136 μ m (131-142) ; repl. odontostyle = 109.5 μ m (107-112).

Juveniles 3rd stage (n = 3) : L = 2.54 mm (2.32-2.69) ; a = 82 (80-86) ; b = 9.5 (8.3-10.8) ; tail = 32 μ m (30-34) ; c = 76.9 (76.5-77.3) ; c' = 1.4 (1.4-1.5) ; odontostyle = 76.5 μ m (70-84) ; odontophore = 42 μ m (40-45) ; stylet = 119 μ m (111-129) ; repl. odontostyle = 91 μ m (88-96).

Holotype (female) : L = 6.33 mm ; a = 124 ; b = 14.4 ; tail = 32 μ m ; c = 198 ; c' = 1.0 ; V = 39.3 ; odontostyle = 120 μ m ; odontophore = 59 μ m.

DESCRIPTION

Female : When heat-relaxed, body ventrally curved in open spiral ; body long and thin, gradually tapering anteriorly, more abruptly posteriorly. Cuticle thin (2.5-3 μ m at mid-body), finely transversely striated, apparently composed of two layers, not thickened in the neck region (only at the base of the lip area). Lateral chord, at mid-body, 11 μ m (9-13) wide, or 27% (22-33) of the corresponding diameter. Cervical papillae very discrete, spaced : two or three dorsal, four or five ventral ; lateral cervical papillae prolonged by latero-subventral pores irregularly and widely spaced on the entire body. Labial area ("head") anteriorly rounded, separated from the rest of body by a smooth but well developed groove ("button-shaped head") ; two conspicuous series (circles) of labial and cephalic papillae. Amphids pouch-like, large, not lobed ; amphid aperture a small pore. Hemizonid flat, poorly developed, weakly refringent, the most often inconspicuous. Hemizonion not observed. Two ventral "pores" present, one anterior, one posterior to hemizonid, situated respectively at 180 μ m (156-196) and 205 μ m (196-224) from anterior end ; in contrast with the anteriorly situated ventro-cervical pores which are very narrow and difficult to locate, these two pores are easily seen because they are more developed, particularly the posterior one, and correspond to smooth notches on both sides of the cuticle ; their

intra-cuticular canal is very thin but it is enlarged at its extension in the muscular layer ; no connection could be discerned with the nerve ring. Nerve ring 13 μ m (12-17) wide, located 27 μ m (15-36) posterior to the base of stylet. Stylet in two parts : odontostyle very refractive, long and thin, often smoothly wavy ; odontophore less refractive, with poorly developed basal flanges, 7-8 μ m wide, not reinforced at their margin. Junction between odontostyle and odontophore forked. Stylet-guide posteriorly situated, at 94 μ m (86-104) from anterior end, appearing as a single and thick ring on all specimens examined which have stylet retracted, or (one specimen) slightly exerted. Protractor muscles of stylet narrow with a bump at level of the guide-ring. Anterior part of oesophagus narrow, cylindrical ; "mucro" in the oesophageal wall, short (2-3 μ m) at very variable distance from the base of stylet (12-62 μ m). Oesophageal basal bulb measuring about 69 \times 18 μ m (64-76 \times 16-20) ; the length is difficult to measure accurately because the anterior end of the oesophageal bulb is not clearly demarcated from the anterior slender part ; dorsal oesophageal gland nucleus small, with small, granulated nucleolus, posterior to the duct of dorsal gland, in the first third of the bulb ; subventral gland nuclei larger, situated about at mid-length of the bulb. Cardia well developed, globular to pyriform. Intestine composed of uninucleate cells. Rectum short, with heavy cuticularized lining. Vulva, a transverse slit, slightly anterior to mid-body. Vagina reaching half the body diameter, with thick cuticular lining ; circular muscle (vaginal sphincter) flat, composed of five or six individual muscles. Ovejector elongated, composed of weakly muscularized cells, not sharply delimited from uterus. Two genital branches, short and stout, of about the same length and of the same structure. Uterus short, wide, cylindrical, composed of globular cells ; internal lumen with refringent spines, directed away from vagina, more abundant at junction with oviduct ; no uterine pouch differentiated. Sphincter joining uterus and oviduct well developed. Oviduct in two parts : a large pouch and a thin cylindrical part joining the ovary. Ovary reflexed at junction with the oviduct with ovocytes on one row. Tail short, rounded, with curvature essentially dorsal ; cuticle thick (7-12 μ m) at tail extremity, with fine radial striations on the internal layer (s) ; no internal blind canal. Two pairs of caudal pores : one lateral, very posteriorly situated ; the other pair about at mid-tail, dorso-laterally situated.

Male : Not known. No spermatozoa seen in genital tract of females.

Juveniles 4th and 3rd stages : Morphology and anatomy (except for genital tract) similar to those of female. Curvature of body less pronounced. Tail

rounded but more elongated, especially in 3rd stage juveniles; two pairs of caudal pores in both stages.

TYPE SPECIMENS

Holotype (Female): deposited at the Muséum national d'Histoire naturelle, Laboratoire des Vers, Paris.

Paratypes: Seven females, four juveniles 4th stage and three juveniles 3rd stage deposited in the same collection. One female deposited in each of the following institutions: Rothamsted Experimental Station, Harpenden, U.K.; Laboratorium voor Nematologie, Wageningen, Nederland; U.S.D.A., National Collection, Beltsville, Md, U.S.A.; Institute voor Dierkunde, Rijksuniversiteit, Gent, Belgie; Universidad Nacional de Córdoba, Centro de Zoología Aplicada, Córdoba, Argentina.

TYPE LOCALITY

Soil, vicinity of roots of *Festuca* sp., at 40 cm depth, Pampa de Achala, San Alberto Dep., Córdoba Prov., Argentina. Flat terrain of medium high altitude (2 200 m); clay soil (ph = 5; N% = 1.8).

DIFFERENTIAL DIAGNOSIS

Xiphidorus achalae n. sp. is characterized by the shape of the amphids, the pore-like amphidial aperture, presence of spines in the uterus, and the two peculiar ventral pores, at level of nerve ring. It is easy to separate from the five described species by its great body length (4.78-6.33 mm vs a max. of 4.2 mm in *X. tucumanensis* Chavès & Coomans, 1984) and its great stylet length (156-179 μ m vs a max. of 153 μ m in *X. balcarceanus* Chavès & Coomans, 1984).

Observations on the genus *Xiphidorus* Monteiro, 1976

This genus appears to be restricted to South America as two of the six known species have been described from Brazil, the other four from Argentina.

By courtesy of A. Monteiro we were able to observe female, male, and juvenile paratypes of the type species *X. yepesara* Monteiro, 1976. The excellent original description and illustration scarcely need supplementing. Thus the following observations are mainly confirmation of important points for systematics of the group.

Amphidial pouch appears very unusual; it is bilobed, shows very thin transverse striae and is divided into two parts by a conspicuous refringent longitudinal line. The amphid aperture is a small, curved, transverse anterior, slit (note that the structure of

amphids is quite variable in the genus (Chavès & Coomans, 1984). Stylet is of *Xiphinema*-type with forked junction of odontostyle and odontophore. The latter is flanged at its base, but the flanges are not so well defined individually and not reinforced at their margins. Concerning the stylet guiding apparatus, the observations have resolved a contradiction in the original description, between the diagnosis, where the stylet guiding apparatus is said to be "tubular", and the illustrations where it appears as a single ring (original Fig. 1 A & 1 C), posteriorly situated. By chance, we were able to observe specimens with protruded and with retracted stylet; in the former, the guide appears as a short tube; in the latter as a single ring, conforming to the original figures where the stylet is retracted. This is explained, if one recalls that the "tube" is actually, as clearly illustrated by Taylor and Robertson (1973), a folded membrane of the stoma wall lining attached posteriorly to this wall and of which the two layers can glide on each other when the stylet is protruded, the inner layer being drawn forward, the basal annule (attachment) remaining fixed; the "anterior ring" of such a tubular guide corresponds to the folding of this membrane. In *Xiphinema* species even when the stylet is retracted a short "tube" remains apparent (Fig. 2B). In *Xiphidorus* this tube is apparently shorter and when the stylet is retracted it becomes fused with the basal ring (Fig. 2D) which is thicker than in *Xiphinema*. Hemizonid and hemizonion were seen in two females; the hemizonid is flat, 4.5 and 5 μ m wide and the hemizonion is lenticular, 2 and 2.5 μ m wide; they are situated, at 146, 155 μ m and 176, 179 μ m from the anterior end, respectively. No ventral pores could be observed in the vicinity of the nerve ring. The female genital tractus is composed of: a well developed ovejector; a short, stout, uterus, without differentiated uterine pouch; a well developed sphincter between uterus and oviduct; a long oviduct pouch. No Z-differentiation is present in uterus, nor spines. Some spermatozoa have been seen in the uterus.

Systematics of the Longidorids

The family Longidoridae, elevated to the rank of superfamily Longidoroidea by Khan and Ahmad (1975), comprises at the moment seven genera: *Xiphinema* Cobb, 1913, *Longidorus* Micoletzky, 1922, *Paralongidorus* Siddiqi, Hooper & Khan, 1963, *Xiphidorus* Monteiro, 1976, *Longidoroides* Khan, Chawla & Saha, 1978, *Siddiqia* Khan, Chawla & Saha 1978 and *Inagrei* Khan, 1982.

The genus *Brevinema* Stegarescu, 1980 is not taken into consideration, as necessitating a reexamination of types of one of the two species enclosed, *Longidorus*

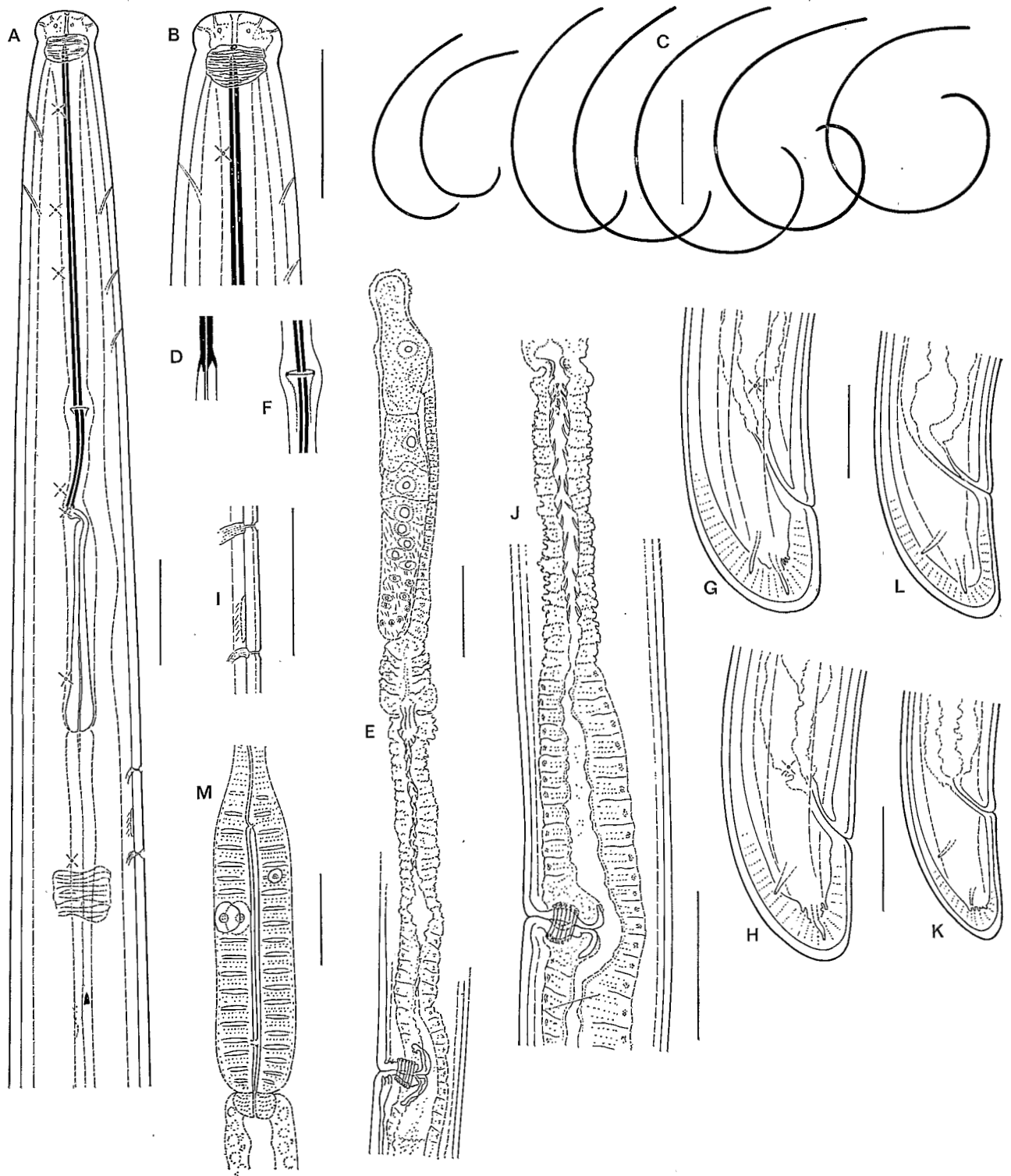


Fig. 1. *Xiphidorus achatae* n. sp. A : Anterior part of body (female) ; B : Lip region and fore part (female) ; C : Body shape of J3, J4 and females ; D : Junction of odontostyle and odontophore ; E : Anterior female genital branch ; F : Stylet guide ; G, H : Female tails ; I : Hemizonid and differentiated ventral pores ; J : Uterus and ovejector ; K : L3 tail ; L : L4 tail ; M : Oesophageal bulb (female). (Each bar represents : A, B, D, F, G, H, I, K, L, M : 25 μ m ; E, J : 50 μ m ; C : 1 mm).

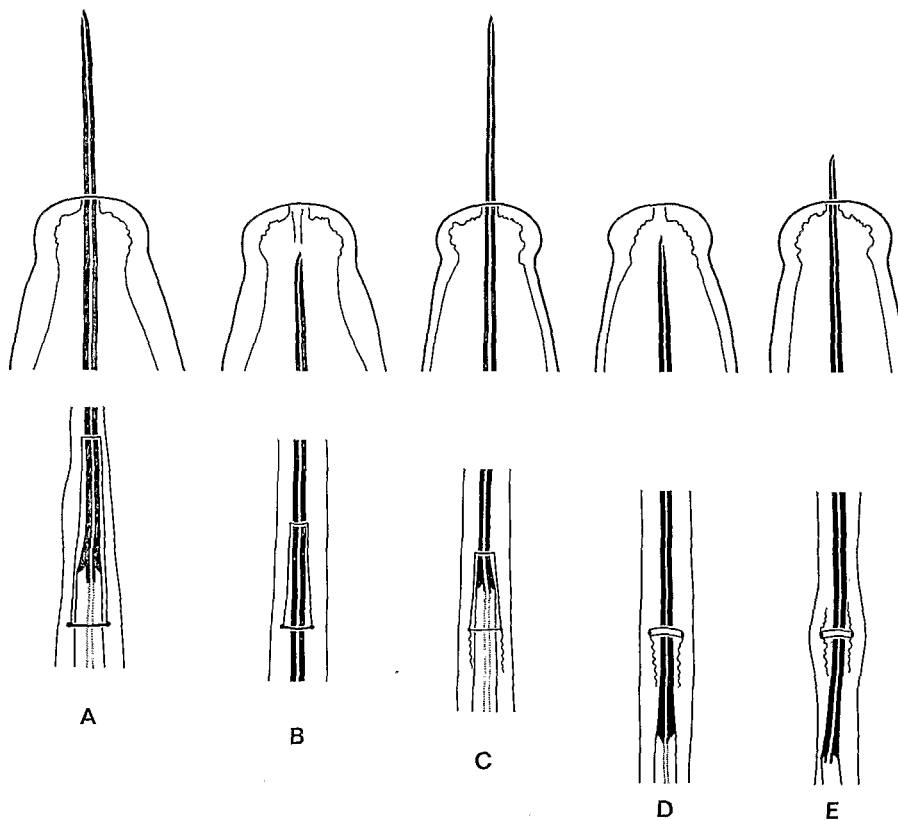


Fig. 2. Comparison of stylet guide in *Xiphinema* sp. (A : exerted stylet ; B : retracted stylet), *Xiphidorus yepesara* (C : exerted stylet ; D : retracted stylet) and *Xiphidorus achalae* n. sp. (E : specimen with slightly exerted stylet). (The bar represents 25 μ m.)

psi Edward, Misra & Singh, 1964 (= *L. siddiqii* Aboul-Eid, 1970). Concerning the second species, described as *Xiphinema sandellum* Heyns, 1966, we agree its transfer to *Paralongidorus* as *P. sandellum* (Heyns, 1966) Chavès & Coomans, 1984.

Californidorus Robbins & Weiner, 1978, with type and unique species *C. pinguicaudatus* Robbins & Weiner, 1978, was considered by its authors to belong to Longidoridae (subfamily Californidorinae Robbins & Weiner, 1978) mainly because of the presence of only three nuclei in the oesophageal bulb. Reexamination of type material by Jairajpuri (1982) showed that five nuclei were present and consequently this author attributed *Californidorus* to Nordiidae Jairajpuri & Siddiqi, 1964, subfamily Pungentinae Siddiqi, 1969. Examination of paratypes confirmed this decision.

A detailed historical account on the group has been published by Khan, Chawla and Saha (1978). Of course, they did not include *Inagrei*us. Their review can be summarized as follows :

Xiphinema and *Longidorus* were considered as valid genera, even if a few species were transferred from one to the other. The main characters used to separate these genera concern the stylet and its guiding-apparatus : in *Xiphinema* the odontophore possesses three basal flanges and the guiding-apparatus, situated at level of posterior part of the odontostyle, is of "tubular" appearance ; in *Longidorus*, the odontophore is devoid of such flanges and the guiding-apparatus, generally situated within the anterior third of the odontostyle, consists of a single ring.

Paralongidorus was created by Siddiqi, Hooper and Khan (1963) to accommodate some species, formerly placed in *Longidorus*, having a slit-like amphidial opening (as in *Xiphinema*), the species remaining in *Longidorus* having a pore-like amphidial opening, often obscure, or even not discernable at all. In *Longidorus*, so defined, the amphids are pouch-like whereas they are funnel-shaped in *Xiphinema*, both types of amphid being present in *Paralongidorus* so

redefined. Dalmasso (1969) pointed out another good differential character : the junction between odontostyle and odontophore is plain (abutted junction) in *Longidorus* and *Paralongidorus* whereas it appears forked in *Xiphinema*. Dalmasso (1969) also designated the subfamily Xiphineminae for *Xiphinema*; *Longidorus* and *Paralongidorus* remaining in the Longidorinae.

Loof and Coomans (1972) draw attention to the importance of the size of the nuclei of the oesophageal glands, as well as of their location in relation to the corresponding ducts of the glands. They observed that these two characters separated *Xiphinema* from *Longidorus* and *Paralongidorus*. In the two latter genera DN* is situated at some distance from DO, and SVN are more developed than DN. Conversely, in *Xiphinema*, DN is at the same level as DO, and SVN are less developed than DN. These observations at the time gave further support for the validity of the two subfamilies. Since some exceptions have been observed in both groups.

Xiphidorus Monteiro, 1976, as seen above, combines characters of these three genera : stylet and stylet-guide closer to those of *Xiphinema*, but amphids and oesophageal bulb nuclei and ducts closer to those of *Longidorus* or *Paralongidorus*.

Khan and Ahmad (1975), with minimal justification, raised the subfamilies Longidorinae and Xiphineminae to the rank of families (Longidoridae and Xiphinemidae), and the formerly Longidoridae to the rank of superfamily Longidoroidea.

Khan, Chawla and Saha (1978) continued this process. At generic level, they divided *Paralongidorus* into three genera :

— *Paralongidorus* s. str., restricted to those species with stirrup-shaped amphids (with broad slit-like opening) and lip region more or less continuous with the rest of body ;

— *Siddiqia* Khan, Chawla & Saha, 1978 for those species having amphids similar to those of *Paralongidorus* s. str. but a lip region separated from the rest of the body by a deep constriction ;

— *Longidoroides* Khan, Chawla & Saha, 1978 for those species having pouch-like amphids (with broad slit-like opening).

At supra-generic level, these authors completed the action of Khan and Ahmad (1975) in creating the family Xiphidoridae for *Xiphidorus*, and in dividing the Longidoridae sensu Khan & Ahmad, 1975 into two subfamilies, Longidorinae (*Longidorus* and

Longidoroides) with pouch-like amphids, and Paralongidorinae (*Paralongidorus* and *Siddiqia*) with stirrup-shaped amphids.

The recently described genus *Inagrei* Khan, 1982 (Paralongidorinae) was created for one new species and one species of *Siddiqia*, both having an amphidial pouch slightly differently shaped from that of other species of the latter genus.

We consider that the present taxonomical situation of Longidorids is neither sound nor justified, and we propose to return to a more simple organization of this group.

At generic level we consider the creation of both *Siddiqia* and *Inagrei* unjustified, these genera differing from *Paralongidorus* or *Longidoroides* in only minor characters related to the shape of the lip region (offset or continuous). Variation of this type may be found within the same genus, e.g. *Xiphinema*, where *X. italiae* Meyl, 1953, *X. opisthohysterum* Siddiqi, 1961 and *X. algeriense* Luc & Kostadinov, 1983 show a lip region separated from the rest of the body by a conspicuous groove, whereas in *X. macrostylum* Esser, 1966, *X. hygrophilum* Southey & Luc, 1973 and *X. stenocephalum* Luc & Baujard, 1983 the lip region is perfectly continuous with the rest of the body. Thus, we propose that *Siddiqia* be considered a junior synonym of *Paralongidorus*, so the following species are transferred back to the latter genus * : *P. capensis* Heyns, 1967 ; *P. citri* (*Siddiqi*, 1959) Siddiqi, Hooper & Khan, 1963, *P. epimikis* Dalmasso, 1969 ; *P. erriae* Heyns, 1965 ; *P. eucalypti* Fischer, 1964 : *P. fischeri* Heyns, 1972 ; *P. georgiensis* (Tulaganov, 1937) Siddiqi, 1965 ; *P. major* Verma, 1973 ; *P. maximus* (Bütschli, 1874) Siddiqi, 1964 ; *P. paramaximus* Heyns, 1965 ; *P. remeyi* (Altherr, 1963) Siddiqi & Husain, 1965 ; *P. spasskii* Heyns, 1973 ; *P. xiphinemoides* Heyns, 1965. In addition the following combinations are proposed : *Paralongidorus mediensis* (Ganguly, Patil & Khan, 1981) nov. comb. (= *Siddiqia mediensis* Ganguly, Patil & Khan, 1981) ; *P. dasturi* (Ganguly, Patil & Khan, 1981) nov. comb. (= *Siddiqia dasturi* Ganguly, Patil & Khan, 1981) ; *P. inagraeinus* (Chawla & Samathanam, 1981) nov. comb. (= *Siddiqia inagraeina* Chawla & Samathanam, 1981) ; *P. spauli* (Jacobs & Heyns, 1982) nov. comb. (= *Siddiqia spauli* Jacobs & Heyns, 1982) ; *P. deborae* (Jacobs & Heyns, 1982) nov. comb. (= *Siddiqia deborae* Jacobs & Heyns, 1982) ; *P. natalensis* (Jacobs & Heyns, 1982) nov. comb. (= *Siddiqia natalensis* Jacobs & Heyns, 1982) *P. indicus*

* DN = dorsal oesophageal gland nucleus. SVN = subventral oesophageal gland nuclei. DO = orifice of the dorsal oesophageal gland (Loof & Coomans, 1972).

* *Siddiqia hooperi* (Heyns, 1966) Khan, Chawla & Saha, 1976 (= *Paralongidorus hooperi* Heyns, 1966) is now considered *Longidoroides hooperi* (Heyns, 1966) Jacobs & Heyns, 1982.

(Phukan & Sanwal, 1983) nov. comb. (= *Siddiqia indica* Phukan & Sanwal, 1983).

The genus *Inagrei* Khan, 1982 is proposed as a junior synonym of *Longidoroides*, and the following transfers proposed: *Longidoroides beryllus* (Siddiqi & Husain, 1965) nov. comb. (= *Inagrei beryllus* Siddiqi & Husain, 1965) Khan, 1982; *Longidoroides gloriosus* (Khan, 1982) nov. comb. (= *Inagrei gloriosus* Khan, 1982). In addition *Siddiqia seclipsi* Khan, Singh & Singh 1981 is transferred too to the genus *Longidoroides*, as *L. seclipsi* (Khan, Singh & Singh, 1981) nov. comb.

The rank of superfamily Longidoroidea, given to the group of Longidorids, appears to us unjustified. Creating this superfamily, Khan and Ahmad (1975) gave as their only argument for it that the type of feeding apparatus (long and attenuated spear and spear extension) prevent these forms from being placed in Dorylaimoidea. This argument appears weak, because founded only on length. Feeding apparatus of such a type in two distinct parts, even with forked junction and flanges at the posterior end, occurs in other families of Dorylaimoidea, for example in *Enchodelus* Altherr, 1963 (Nordidae). In our opinion, even if Longidoridae *sensu* Hooper & Southey, 1973 differ substantially from the other families of Dorylaimoidea, namely in their long body, long stylet, the presence of only three nuclei in the glandular part of the oesophagus and their proven plant-parasitism, they still conform to the general scheme of the Dorylaimoidea, and do not require to be separated from them. Thus superfamily Longidoroidea is considered a junior synonym of Dorylaimoidea, and the Longidorids are treated as a family, Longidoridae. The main characters of the different genera of the family are found in a puzzling variety of possible combinations (Table 1). Therefore it appears useless to define subfamilies within the Longidoridae.

To summarize our views, we propose the following classification of the Longidorids:

Superfamily Dorylaimoidea de Man, 1876
(Thorne, 1934)
= Longidoroidea Thorne, 1935
(Khan & Ahmad, 1975)

Family Longidoridae Thorne 1935 (Meyl, 1961);
Hooper & Southey, 1973 *emend.*

DIAGNOSIS

Dorylaimoidea. Large nematodes, 1.5-1.3 mm long; spear (odontostyle) greatly attenuated, 50-220 μm , plus a long extension (odontophore) which is plain or more or less heavily flanged. Anterior part of

oesophagus a narrow tube; posterior part a wider muscular cylinder with a dorsal gland nucleus and two subventral nuclei*. Tails of males and females somewhat similar where both sexes are known. Spicules with lateral guiding pieces but no gubernaculum; testes paired, opposed; a series of prominent preanal supplementary papillae, including an adanal pair. Lateral chords relatively broad with lateral pores; dorsal and ventral body-pores also sometimes present, especially at anterior end. Lip region rounded, continuous with, or set off from body, with six amalgamated lips bearing sixteen papillae arranged in two circles, six inner, ten outer. Amphids pouch-like or stirrup-shaped, large, extending back from base of lip region.

TYPE GENUS: *Longidorus* Micoletzky, 1922

Longidorus Micoletzky, 1922

DIAGNOSIS

Longidoridae. Odontophore plain. Junction of odontostyle and odontophore plain. Stylet guiding apparatus a single ring, anteriorly situated (at most at level of anterior third of the odontostyle). Amphids pouch-like. Amphid aperture a small pore, often inconspicuous. DN most generally some distance from DO. SVN most generally more developed than DN.

TYPE SPECIES

Longidorus elongatus (De Man, 1876) Thorne & Swanger, 1936.

OTHER GENERA:

Xiphinema Cobb, 1913

DIAGNOSIS

Longidoridae. Odontophore flanged. Junction of odontostyle and odontophore forked. Stylet guiding apparatus appearing tubular, situated posteriorly

* Five oesophageal gland nuclei have been mentioned, and in some cases illustrated, in the original descriptions of *Xiphinema index* Thorne & Allen, 1950, *X. basiri* Siddiqi, 1959 and *X. neoamericanum* Saxena, Chabra & Joshi, 1973. Further examination of type specimens of *X. index* by Siddiqi (1974) and of *X. basiri* by Loof and Yassin (1971) did not permit the observation of the two posterior subventral gland nuclei. *X. neoamericanum* is most probably in the same situation.

(posterior third of odontostyle). Amphids stirrup-shaped. Amphid aperture a large slit. DN most generally at same level as DO. SVN less developed than DO.

TYPE SPECIES

Xiphinema americanum Cobb, 1913

Paralongidorus Siddiqi, Hooper & Hhan, 1963
= *Siddiqia* Khan, Chawla & Saha, 1978, n. syn.

DIAGNOSIS

Longidoridae. Odontophore plain. Junction of odontostyle and odontophore plain. Stylet guiding apparatus a single ring, anteriorly situated (at most at level of anterior third of odontostyle). Amphids stirrup-shaped. Amphid aperture a large slit. DN some distance from DO. SVN most generally more developed than DN.

Table 1
Characters used to distinguish the genera of Longidoridae (based on Hooper, 1979)

	<i>Longidorus</i>	<i>Longidoroides</i> = <i>Inagrei</i> us	<i>Paralongidorus</i> = <i>Siddiqia</i>	<i>Xiphidorus</i>	<i>Xiphinema</i>
Stylet guide "tubular", around posterior part of odontostyle				+	+
Stylet guide a single ring, around anterior part of odontostyle	+	+	+		
Odontostyle base plain	+	+	+		
Odontostyle base "forked"				+	+
Odontophore base thickened but not flanged	+	+	+		
Odontophore base flanged				+	+
Amphid aperture pore-like or inconspicuous	+			+	
Amphid aperture slit-like		+	+	+	+
Amphids pouch-like	+	+		+	
Amphids funnel to stirrup shape			+		+
Dorsal gland nucleus close to dorsal gland opening					+
Dorsal gland nucleus some distance from dorsal gland opening	+	+	+	+	

TYPE SPECIES

Paralongidorus sali Siddiqi, Hooper & Khan, 1963.

Xiphidorus Monteiro, 1976.

DIAGNOSIS EMEND.*

Longidoridae. Odontophore flanged. Junction of odontostyle and odontophore forked. Stylet guiding apparatus situated posteriorly (posterior third of odontostyle), appearing as tubular on specimens with protracted stylet, as a thick single annule on specimens with retracted stylet. Amphid aperture a small transverse slit. DN some distance from DO. SVN more developed than DN.

TYPE SPECIES

Xiphidorus yepesara Monteiro, 1976.

Longidoroides Hhan, Chawla & Saha, 1978

= *Inagreiis* Khan, 1982, n. syn.

DIAGNOSIS

Longidoridae. Odontophore plain. Junction of odontostyle and odontophore plain. Stylet guiding apparatus a single ring, anteriorly situated (at most at level of anterior third of odontostyle). Amphid pouch-like. Amphid aperture slit-like. DN some distance from DO. SVN more developed than DN.

TYPE SPECIES

Longidoroides afzali (Khan, 1964) Khan, Chawla & Saha, 1978

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* Chavès and Coomans (1984) gave an amended diagnosis of the genus. This diagnosis, although complete, is not retained here because it takes into consideration several characters of which the presence or the absence have not been evaluated in other genera of the family. For the time being we prefer to propose a more simple diagnosis, better related to those of other genera.

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