

CUTICULAR RIDGES ON LATERAL FIELDS OF  
INVASIVE LARVAE OF NEOAPLECTANA (NEMATODA:  
STEINERNEMATIDAE)

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**Abstract.** Differences in surface structure of lateral fields of invasive larvae in the genus *Neoplectana* are shown. *Neoplectana glaseri*, *N. anomali* and *N. feltiae* larvae have 8 ridges in lateral fields, isomeric in the first two and of unequal thickness in the latter. Larvae of *N. intermedia* have 4 ridges. *N. carpocapsae* larvae and those of the culture from Ryazan region have 5 ridges.

Nematodes of the family Steinernematidae are studied intensively, but their taxonomy is still obscure. For example there is no consent on the question of the composition of this family. Wouts et al. (1982) have proposed to regard the genus *Neoplectana* Steiner, 1929 as a junior synonym of *Steinernema* Travassos, 1927. Concerning that question we should like to point out that objections of Poinar (1984) against the synonymization seem probably formal, but strong enough. We for the time being accept the old system of Steinernematidae. Currently the invasive larvae of Steinernematidae are not determinable at all. Lateral ridges are unique feature of invasive larvae morphology. Here we give the SEM-microphotographs of the invasive larvae of several species of the genus *Neoplectana*.

MATERIALS AND METHODS

Invasive larvae of the species *N. glaseri* Steiner, 1929, *N. feltiae* Filipjev, 1934, *N. carpocapsae* Weiser, 1955, *N. anomali* Kozodoi, 1984, *N. intermedia* Poinar, 1985 and those of undetermined species of *Neoplectana* belonging to the culture isolated in Ryazan region were reared on last-instar caterpillars of *Galleria melonella*. Invasive larvae were fixed in formalin (6-8%), dehydrated in ethanol solutions and acetone, dried and coated by palladium. The larvae were attached to aluminium cylinders by selfmade gley (scotch tape sticky substance plus aluminium powder), and studied in JSM-35. At least 8 larvae of each species were studied. Photographs were made in the middle of the body (laterally). Data on the steinernematids studied are summarized in Table 1.

Table 1. Data on studied steinernematids

Isolate	Locality of isolation	Author of determination
<i>N. anomali</i>	USSR, Voronez Region	E. M. Kozodoi
<i>N. carpocapsae</i>	USSR, Leningrad Region	G. V. Veremetchuk
<i>N. feltiae</i>	USSR, Udmurtskaya ASSR	E. M. Kozodoi
<i>N. glaseri</i>	USA, North Carolina	G. O. Poinar Jr.
<i>N. intermedia</i>	USA, North Carolina	G. O. Poinar Jr.
undetermined species	USSR, Ryazan Region	

## RESULTS AND DISCUSSION

Invasive larvae of *N. glaseri* are shown in Fig. 1 A. There are 8 isomeric ridges separated from each other by equal grooves. Annulations of median cuticle end on marginal ridges of lateral field.

In *N. anomali*, there are also 8 cuticular ridges in the lateral field but a central groove is wider in this species than in *N. glaseri*, presenting central cuticular stripe.

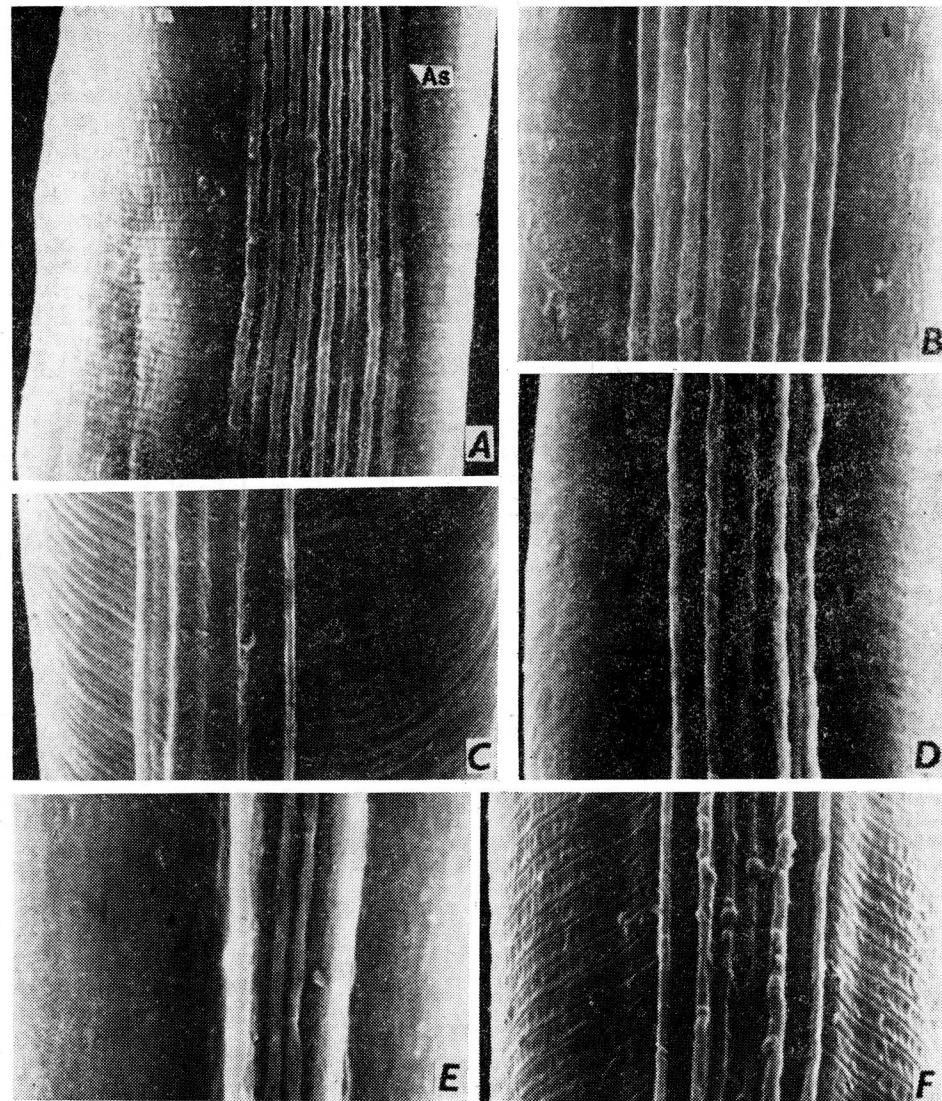


Fig. 1. Surface structure of *Neoplectana* invasive larvae, SEM. A — *N. glaseri* (As — annulations of cuticle on marginal ridges) ( $\times 2000$ ). B — *N. anomali* ( $\times 3000$ ). C — *Neoplectana* culture from Ryazan Region ( $\times 2000$ ). D — *N. carpocapsae* ( $\times 2000$ ). E — *N. intermedia* ( $\times 2000$ ). F — *N. feltiae* ( $\times 2000$ ).

Lateral fields of larvae belonging to the culture from Ryazan region are presented by 5 ridges. Central unpaired ridge is surrounded by two strongly elevated ridges, which have much in common in appearance with two marginal ones. Between these two thick ridges small folds are visible on each side of the field (Fig. 1 C).

Lateral fields of *N. carpocapsae* are virtually the same as in *Neoplectana* from Ryazan region except that small folds are more conspicuous (Fig. 1 D).

In the recently described species *N. intermedia* lateral field comprises only 4 ridges: two massive marginal and two slender central ones. There are small folds on the border of the lateral field near the bases of marginal ridges (Fig. 1 E).

In *N. feltiae* we find 8 ridges: two comparatively thin central, and four more thick, situated on the margins of the field. But sometimes between these two thick ridges a small one is visible (Fig. 1 F).

Poinar (1979) was the first author (so far as we know) who pointed out the possible application of lateral field morphology of invasive larvae in steinernematid systematics. The largest contribution to this goal was the article of Bird and Akhurst (1983) with descriptions of steinernematid invasive larvae ultrathin sections. These authors also differentiated their undescribed species — culture Q1 from other steinernematids on the basis of lateral field morphology. SEM visualization of the lateral field morphology gives us some extra possibilities to discuss this feature of steinernematids. It may be noted that our data on lateral field morphology in *N. glaseri* and *N. feltiae* and information on these species of Bird and Akhurst are in full concordance. The species *N. anomali* has much in common with *N. glaseri*, what might be a result of convergence (Poinar and Kozodoi, in press). There are also some similarities in the morphology of lateral fields of invasive larvae in these species, but some differences also exist (e.g., central stripe in *N. anomali*). Some resemblance exists also between *N. carpocapsae* and larvae of *Neoplectana* culture from Ryazan region, but not a full identity either. Thus all the 6 species investigated here are well differentiated on the basis of lateral field morphology of invasive larvae. It is important to point out that in cases of similarities (*N. glaseri*—*N. anomali*; *N. carpocapsae*—*Neoplectana* from Ryazan region) the species may be well differentiated on the basis of other features (spicular morphology, measurements, electrophoretic data).

We would like to add that steinernematid systematization with the use of lateral field morphology gives a possibility of their quick determination in soil samples and presents a key to further development of field ecology of Steinernematidae.

### КУТИКУЛЯРНЫЕ ГРЕБНИ НА ЛАТЕРАЛЬНЫХ ПОЛЯХ ИНВАЗИОННЫХ ЛИЧИНОК НЕОПЛЕКТАНА (NEMATODA: STEINERNEMATIDAE)

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**Резюме.** Выявлены межвидовые различия в строении поверхности латеральных полей инвазионных личинок неоплектан. Инвазионные личинки *N. glaseri*, *N. anomali* и *N. feltiae* имеют по 8 кутикулярных гребней в составе латерального поля, одной толщины у первых двух и неравной толщины у последнего вида. Личинки *N. intermedia* имеют 4 кутикулярных гребня. Личинки *N. carpocapsae* и неопределенных до вида неоплектан из культуры выделенной в Рязанской области имеют по 5 гребней.

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