region; number of segements behind which budding zone develops (n) = 16.

Dorsal setae from VI, 1 hair and 1 needle per bundle. Hairs simple, 90–98 μ long, less than the diameter of the body. (Hairs 110–115 μ in original description). Needles 52–60 μ long with distal end expanded web-like with a maximum breadth of 15 μ, its free margin with 9 indentations. Figure of the needle closely resembles that given by the original author. Ventral setae of II–V 5 per bundle, slighly. curved, 110–118 μ long, nodulus proximal (D:P:: 25 : 13–24 : 13), prongs equally thick, distal longer than the proximal. Ventral setae from VI onwards 4 per bundle, with shaft proximally more curved than those of II–V, 52–55μ long with distal nodulus (D:P:: 6:11-5: 12; proximal prong longer and 3 times thicker than the distal.

Posterior end of the worm bears a branchial organ, cup-shaped, with a pair of cylindrical palps and 3 pairs of digitiform gills, ventral pair being the longest.

Alimentary canal shows distinct stomachic enlargement in IX.

Single budding zone is observed in one worm, clitellum is absent.

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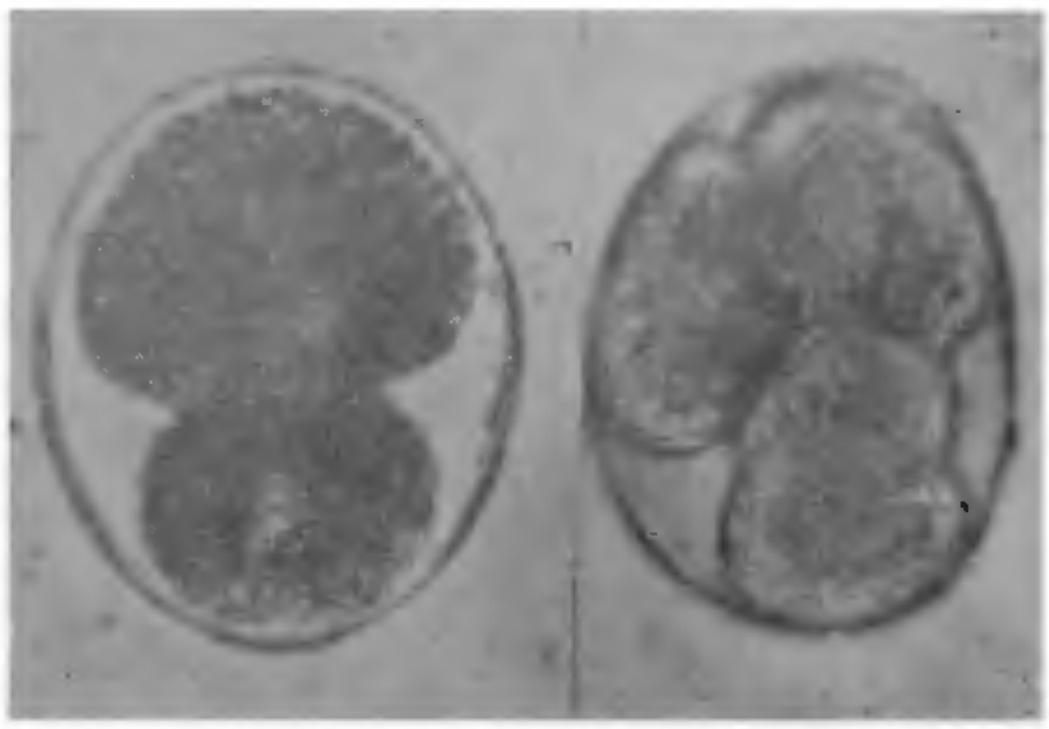
ON NEMATODE CLEAVAGE PATTERN WITH SPECIAL REFERENCE TO *TANQUA ANOMALA* (V. LINSTOW, 1904) (GNATHOSTOMATIDAE) FROM THE WATER SNAKE *NATRIX PISCATOR* SCHNEIDER

In the embryology of nematodes, there are certain unique and characteristic features in respect of early cleavage stages which are of general interest. Detailed work on the embryology of nematodes has been done by several investigators. Work on the embryology of nematodes has been reviewed by Nigon[1] and much information has been given by Bird[2]. Parasitology is becoming increasingly popular in the curriculum of Indian Universities and in the search for interesting and easily available teaching models, it is found that the nematode *Tanqua anomala* from the stomach of the water snake *Natrix piscator*, forms good material.

Thus, the embryology of *Tanqua anomala* is a suitable model to project the characteristic cleavage pattern, resulting in a three celled stage and the characteristic 'T'-shaped condition in the four celled stage. The egg is oval with a thin and transparent egg shell allowing easy observation of the early stages of the cleavage. The first cleavage was observed in 1–2 hours after egg laying, dividing the egg into a bigger Sl cell and smaller Pl cell (Fig. 1 A). The Sl cell divides next and a three celled condition occurs. After this Pl cell divides and the typical 'T'-shaped condition is reached (Fig. 1 B).



A B

FIG. 1. Cleavage of the nematode *Tanqua anomala* egg. A, Two celled stage; B, Four celled stage; 'T'–shaped condition.

In general the first cleavage in nematodes results in the formation of two cells, a somatic cell Sl and a parental germ cell Pl. In some cases, at this stage, the cells are unequal, the Sl cell being bigger than the Pl cell as in *Ditylenchus dipsaci*[3] or as in *Rodopholus similis*[4]. In the next stage Sl usually divides longitudinally whereas Pl divides transversely so that a characteristic 'T'-shaped condition is displayed. However, sooner or later a rearrangement of cells occurs and a rhomboid shape becomes evident. A slight delay in the division of Pl may result in a three celled condition for some time. In *Ditylenchus destructor*[5] or in *Meloidogyne naasi* one blastomere may not divide until the second one has divided twice resulting in a five celled stage. The interesting case is that of *Tylenchorhynchus claytoni* where Wang[7] reported that at the two celled stage Sl and Pl are almost equal in size. Sl divides into 'A' and 'B' cells. The 'A' cell divides obliquely into 'a' and 'a' cell. There occur three divisions of Sl cell at this stage but Pl divides much later. There are cases where although a three celled condition is reached, the cells lie in a linear fashion as in metastrongyloid *Dictyocaulus filaria*[8] or protostrogyloid *Varesstrongylus pneumonicus*[9]. In *T. anomala* at the three celled stage the blastomeres lie in a triangular condition.

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INCIDENCE OF 'SPRING DWARF' DISEASE OF STRAWBERRY FROM INDIA

CONCERTED efforts are being made to popularise strawberry cultivation and also to establish th nurseries in plains of the Punjab State. Recently a large number of plants of different varieties, *viz.*, Gorella, Bangalore, Ped, Clomax, Black rose and Dil-pasand brought from Chail, Simla Hills (H.P.), maintained in nurseries at Punjab Agricultural University, Ludhiana, were highly stunted with deformed stems and leaves and failed to produce runners. On examination these plants were found infected with a bud and leaf nematode of the genus *Aphelenchoides*. Numerous individuals (males, females and other larval stages) of this nematode were extracted from stem, leaves and buds of the infected plants when immersed in water for a day. These individuals were processed and identified as *Aphelenchoides fragariae* (Ritzema Bos, 1891) Christie, 1932, the causal agent of 'spring dwarf' or 'crimp' disease of strawberry.

Some leaves of the infected plants in Gorella, Bangalore, and Dil-pasand, were having red colouration; such symptoms have also been reported to occur in this disease from Europe (Throne, 1961). Detailed studies on production of symptoms by this nematode on different varieties and other aspects are in progress.

This was first recorded from U.S.A. by Ritzema Bos (1890). Later on it has also been found to occur in some European countries. This is the first time its incidence has been recorded from India.

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INCIDENCE OF A VIRUS DISEASE OF MUSKMELON (*CUCUMIS MELO* L. VAR. *RETICULATUS*) IN W. BENGAL

ONE of the major limitations in the large-scale introduction of the improved varieties of muskmelons in W. Bengal is their susceptibility to virus diseases. The natural incidence of virus diseases of local muskmelons is surveyed in the muskmelon fields in the riverbed of the Ganges around the districts of Nadia and 24 Parganas. Three locations were selected and in each location three field plots were selected at random. In each, 100 plants were observed for the incidence of virus diseases at the end of the growing season. In this way about 900 plants ($2\frac{1}{2}$–$3\frac{1}{2}$ months old) were observed. The percentage of infected plants varied between 20 and 45. The infected plants had pale yellow leaves with green veinbanding. There was an inward curling of the leaves. Yellowish chlorotic mottle was developed from the margin of the leaves. The leaves were reduced in size and the growth of the plant also stunted. With infective sap obtained from the diseased leaves in 0·1 M citrate phosphate buffer (pH 7·2, 1 gram leaf : 1 millilitre buffer), the symptoms were easily transmitted to healthy muskmelon seedlings. The percentage of positive transmission was about 73. If phosphate buffer were used as the extraction media, the percentages of transmission were low in comparison to that obtained with material in citrate phosphate buffer.

Thermal inactivation point, dilution end point and the ageing (*in vitro*) of this virus in sap are 50° C–55° C, 1 : 50–1 : 100 and 120–144 h at room temperature and 168–192 h at 6° C respectively. The virus disease could be transmitted to cucumber (*Cucumis sativa* L. local), pumpkin (*Cucurbita moschata* Poir), rib gourd (*Luffa acutangula* Roxb.), cowpea (*Vigna sinensis* L.) and *Chenopodium amaranticolor* L. But it does not infect tobacco (*Nicotiana tabacum* L.) and Datura (*Datura stramonium* L.). In *C. amaranticolor*, it produces necrotic local lesions at the beginning of infection, but later, systemic symptoms develop.

The present study indicates that the properties of this virus does not resemble any that has been described for cucurbit virus strains so far reported from India[1]. They however agree with that of the virus (Webb and Bohn[3]; Webb[4]; Nelson *et al.*[2]). The two viruses have similar thermal inactivation point and dilution end point. Both infect cucurbitaceous hosts or can produce local lesions in *C. amaranticolor*. However, the ageing (*in vitro*) property of the virus, under consideration,