

THE FUNCTION OF THE DEMANIAN SYSTEM  
AND AN ATYPICAL COPULATORY BEHAVIOUR  
IN *ONCHOLAIMUS OXYURIS*

by

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ABSTRACT

In this paper information concerning the function of the demanian system is presented and related to the atypical copulatory behaviour observed in *Oncholaimus oxyuris*. It appears that the system in this species at least is the usual site from which sperms enter the female reproductive system.

OBSERVATIONS

*Oncholaimus oxyuris* DITLEVSEN, 1911 was maintained in agar cultures at room temperature and observations were made on living specimens in observation chambers as described by MAERTENS (1976). Formalin fixed and glycerin mounted specimens were used for more detailed morphological observations.

The demanian system of *O. oxyuris* is typical of the genus (cf. RACHOR, 1969) and consists of a very long and narrow ductus uterinus (about 10-14 body-widths long), a well developed uvette, and a rather wide main duct leading posteriorly to several terminal ducts which end in pores, and anteriorly to a ductus entericus connected with the intestine through a rather poorly defined osmosium. The ductus entericus is slightly longer than the main duct. The terminal pores are usually preanal or adanal in position and are variable in number (Fig. 1); sometimes a secretion may adhere to the pores.

In agar cultures copulation was only occasionally observed; it continued for up to 20 min. The frequency of mating can be considerably increased by storing the cultures for at least three days in the dark at 10° C and subsequently transferring them to daylight at room temperature, after which most of the mature specimens copulate within 24 h. Mature females always had some oocytes within the gonoduct. Males touching the posterior end of such females react violently and bring their tail end in contact with that of the female. Insemination is usually effected by the introduction of the spicules into one of the preanal terminal pores of the female's demanian system. During mating the partners may form an acute or obtuse angle with each other (Fig. 2), or may be orientated in opposite directions. After ejaculation sperm cells are quickly shifted to the main duct where they cluster behind a dark plug of secretory material. The spermatozoa then pass through the uvette into the ductus uterinus and from there to the uterus, where the oocytes are fertilised. A few hours later the eggs become surrounded by an egg shell. The

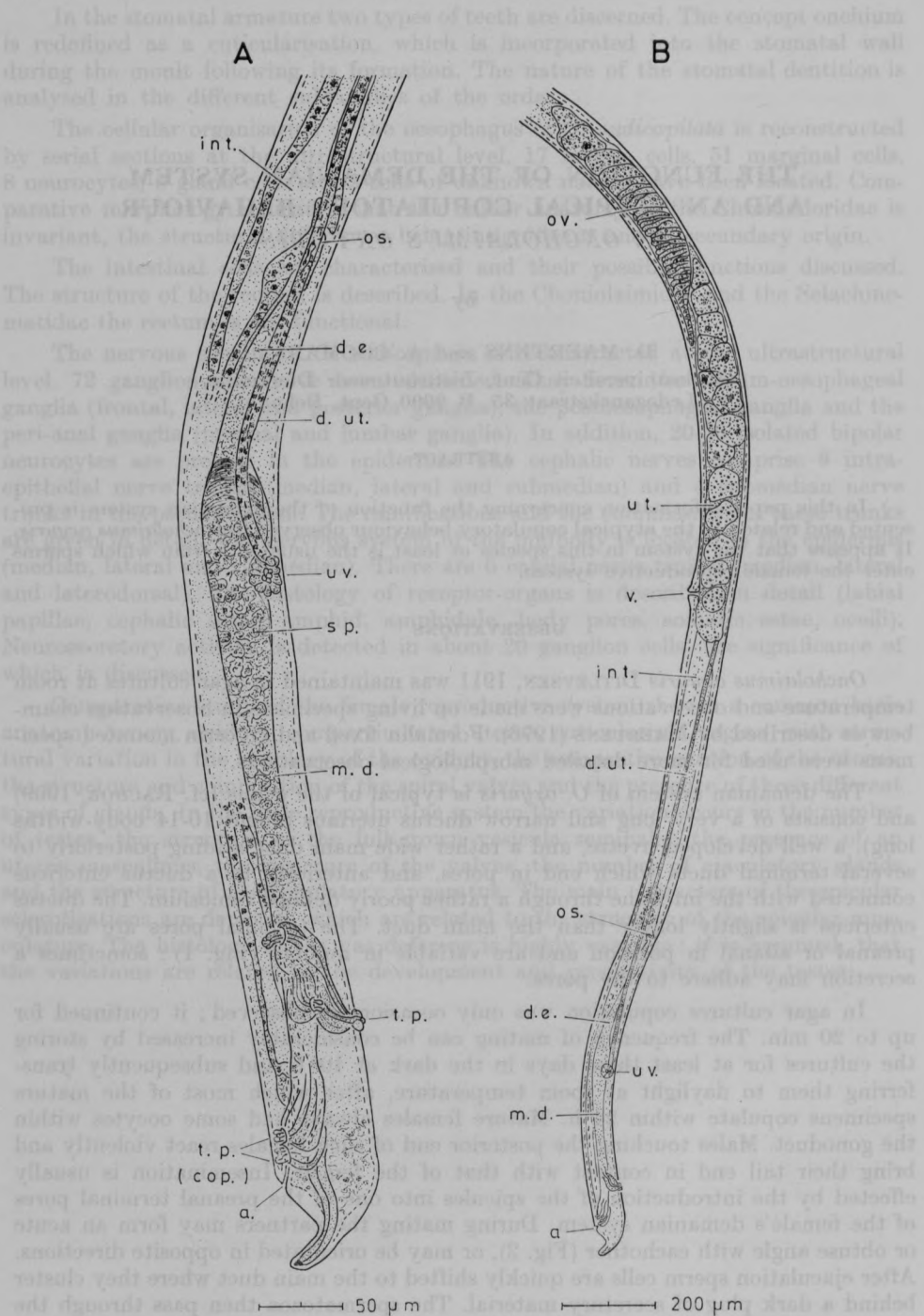


Fig. 1. — *Oncholaimus oxyuris* A : posterior part of the demanian system after copulation ; B : female reproductive system.

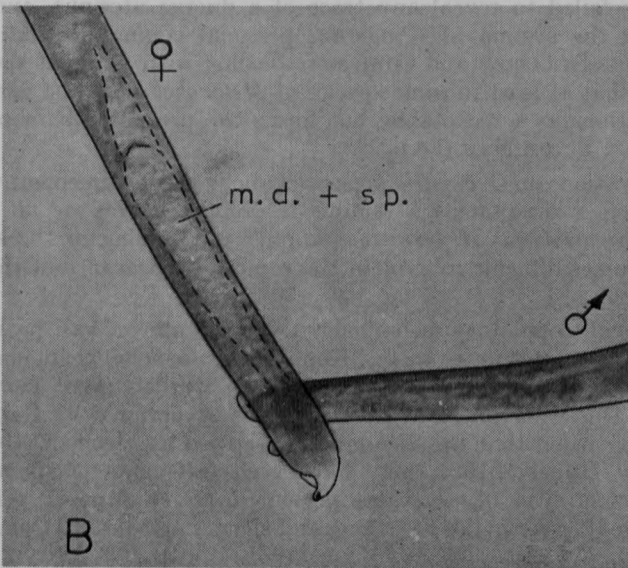
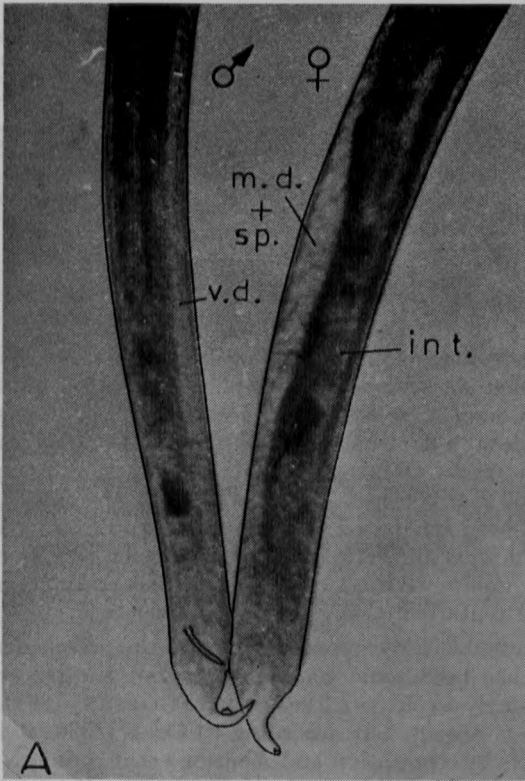


Fig. 2. — *Oncholaimus oxyuris* Copulation — A : fixed specimens (spicules retracted during fixation) ; B : living specimens.

ABBRÉVIATIONS : *a.* = anus, *cop.* = copulation, *d.e.* = ductus entericus, *d.ut.* = ductus uterinus, *int.* = intestine, *m.d.* = main duct, *os.* = osmosium, *ov.* = ovary, *sp.* = spermatozoa, *t.p.* = terminal pore, *ut.* = uterus, *uv.* = uvette, *v.* = vulva, *v.d.* = vas deferens.

remaining spermatozoa, together with the plug of secretion, soon disappear from the system. Possibly they disintegrate, and the remaining material may be absorbed. This would explain why only one day after copulation, spermatozoa are difficult to observe in the demanian system.

#### DISCUSSION

After a thorough and comparative morphological study, RACHOR (1969) concluded that the demanian system is a complicated receptaculum seminis in which the spermatozoa are kept alive by help of secretions from the osmosium. Although good evidence is available for some species such as *Meyersia minor* HOPPER, 1967 and *Adoncholaimus fuscus* (BASTIAN, 1865), the presence of spermatozoa in the demanian system of many other species was only presumed. Prior to RACHOR, other functions had been attributed to the system (see RACHOR, 1969 for a complete review) : Already in 1893 DE MAN had postulated the secretion of a preanal belt in *Metoncholaimus albidus* (BASTIAN, 1865) and the production of a kind of sex attractant has been tentatively suggested several times.

In order to function as a receptaculum seminis the presence of a ductus uterinus is essential. There has been some controversy about the presence of this duct in *Metoncholaimus*, namely in *M. pristiurus* (ZUR STRASSEN, 1894). According to ZUR STRASSEN (1894) it is absent, but according to COBB (1930) it is present. RACHOR (l.c.) accepted Cobb's interpretation and mentions that a ductus uterinus is present in all *Metoncholaimus*-species. Recent electron-microscopic investigation of *M. pristiurus* however failed to reveal any trace of a ductus uterinus, and sperms were not present in the system (J. CALCOEN, personal communication). Hence, it is possible that ZUR STRASSEN and COBB were dealing with different species. Furthermore it seems that at least in some species of *Metoncholaimus* the demanian system no longer functions as a receptacle, but forms the preanal belt of mature females as first observed by DE MAN (l.c.).

The observations on *O. oxyuris* presented above are in agreement with RACHOR's conclusion when a receptaculum seminis is defined merely as an organ for the reception of spermatozoa. If, however, storage and feeding of the spermatozoa is implied, it becomes difficult to explain the rapid disappearance of the spermatozoa from the system.

The atypical copulatory behaviour described above was probably seen by VON THUN, but was interpreted as « ... Kopulationsversuche, bei denen die Spicula... durch die Kutikula des Hinterkörpers gestossen wurde » (VON THUN in RACHOR, 1969, p. 152). This behaviour was believed to be exceptional by RACHOR (l.c.) who nevertheless suggested that the « scytalia » described by HOPPER (1967) for *Metoncholaimus pelor* HOPPER, 1967, may have been fragments of spicules broken off during copulation. The observations presented above support this assumption, especially since *M. pelor* males have long and slender spicules that may easily break.

As to the possible secretion of a sex attractant, direct evidence is lacking but the behaviour of males upon touching the posterior region of females is suggestive of such a secretion.

## RÉSUMÉ

La fonction de l'organe de DE MAN et un comportement copulatoire atypique chez *Oncholaimus oxyuris*.

Des observations sur des individus vivants, maintenus dans des cultures d'agar et dans des chambres d'observation, et sur des spécimens fixés ont relevé que l'insemination est réalisé par l'intermédiaire des pores terminaux de l'organe de DE MAN. La fonction de cet organe est discutée.

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THE EXCRETION ORGAN OF *SARITTIERIA*  
(NEMATODA, CHROMADORIDA)  
AND ITS PHYLOGENETIC SIGNIFICANCE

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## SUMMARY

*Sarittiera* (Concommatidae) has not only an uniloculated ventral gland cell as other Chromadorida but in addition lateral ducts are attached to the secretory ampulla. The lateral ducts are ending in pyriform uniloculated glands lying far behind the oesophageal region. This situation reminds of a secretorian type of secretory organs.