Then one of the plates (on the left side) was seen covered with white flocculent material which soon after drying became white. The insect (which was under a binocular) was actively moving its legs first of one side and then of the other. In that way the legs actually brushed off the wax accumulated on the plate and by dashing the legs here and there it distributed the wax or the meal all over the body.

As the plates on the left side were active, the left side of the body was covered with wax, first the abdomen and its end, then the underside of the wings and then the front part of the body. Gradually all the plates began to secrete wax which was being spread all over the body. All the plates were in full action by 3 p.m., *i.e.*, 5 hours after emergence.

The structure of the meal or the wax secreted is very peculiar. It is in the form of spiral threads as if forced out through small holes, but under abnormal conditions, or if the meal is not constantly removed by the brushes on legs, it assumes the form of long threads appearing like silken combs or tufts. While observing the eclosion of flies from the pupæ, I have seen several specimens with three-fourths of their body out and struggling hard to extricate the last part of the body. The insect is standing erect and dashing its legs in the air and with wings in the unexpanded condition. The wax-plates are active and the wax begins to appear on the body. As no brushing off is possible in that condition, the wax goes on accumulating and a very thick brush-like layer is formed.

Under microscope these appear like bunches of long threads with one end curved. I have also observed cases of partial emergence wherein the flies have died after the upper part of the body *head and thorax* having come out and the abdomen remaining inside the pupal case. In such cases I have found after pulling out the abdomen that it was full of waxy brushes, proving thereby that the wax-plates were actively secreting wax even if the abdomen was enclosed in the pupal covering.

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Hermaphroditism in *Lycastis indica* (Southern).

HERMAPHRODITISM in Polychæta is of such rare occurrence that only about a score of forms are known to be bisexual out of several hundreds of species described. Most of these belong to families Sabellidæ and Nereidæ and among the latter, *Lycastis quadraticeps* (Gay) has been described by H. P. Johnson[1,2] from the Straits of Magellan on the Chilean coast, as exhibiting the phenomena of hermaphroditism and gigantic ova. Many species of *Lycastis* have been recorded in recent years mostly from Sumatra and Java, the genus now consisting of about a dozen distinct species, leaving out one or two doubtful cases. With the exception of *Lycastis brevicornis* (Aud et M. Edw., 1832-34), first described from the coast of France but which has not been rediscovered, all the known species are from the tropics. They are capable of enduring great variations in salinity and sometimes even enter fresh-water and many of them are gradually getting themselves adapted to life in wet mud like earthworms. *Lycastis indica* (Southern), the only known Indian species of this genus, is common in the backwaters of Cochin, Madras and Calcutta and several other places in India and probably also has a much wider coastal distribution than is at present known. In Madras the author has seen it inhabiting situations where the salinity is nearly as high as that of the sea and more frequently in places where the water is almost fresh, the species having been taken even from pools of fresh-water near Adyar.

The worms usually attain a size of 20 to 25 cms. Gonads develop rather early in life. Thorough examination of some hundreds of specimens reveals that *Lycastis indica* is hermaphrodite and protandrous. The male sexual elements appear first and when young the worms pass through a male phase, the body cavity now containing masses of motile spermatozoa only. The ova develop later in life, both motile sperms and mature ova occurring in almost all the segments, the worm now being truly hermaphrodite. This

[1] Johnson, H.P., "Fresh-Water Nereids from the Pacific Coast and Hawaii with General Remarks on Fresh-Water Polychæta," *Mark Anniversary Volume*, 1903, 205–223.

[2] Johnson, H. P., "*Lycastis quadraticeps*, a hermaphrodite Nereid with gigantic ova", *Bio. Bull.*, 1907-8, **14**, 371–386.

condition is observed in all the full-sized worms. A detailed account of the life-history and the bionomics of this interesting Nereid will be published shortly.

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The Existence of the Intervertebral Ligament in the Vertebral Column of a Perennibranchiata (*Necturus maculatus*).

GADOW[1] has stated: "In many Urodela, especially in the Perennibranchiata, the whole intervertebral cartilage acts as the joint, being, in fact, a flexible mass intercalated between the bases of the hollow calcified cones of the successive vertebræ. However imperfect this joint may be, it does fulfil the requirements of these long-bodied and long-tailed aquatic Urodela."

Subsequent authors like Schauinsland,[2] Kingsley[3] and Goodrich[4] have supported the statement of Gadow.

On examining an adult specimen of *Necturus maculatus* we found that its body is quite flexible like that of an ordinary teleostean fish. This led us to reinvestigate the development of the intervertebral elements of *Necturus maculatus* and we have found the existence of an intervertebral ligament like that of the fish.

Mookerjee[5] has shown that in all Vertebrata the skeletogenous layer aggregates round the notochordal sheaths forming the perichordal tube. The same author[6] has shown for the first time in a higher Urodela, such as in *Triton vulgaris* that the Vertebral portions of the perichordal tube soon becomes osseous forming a series of hour-glass-shaped bony rings while the intervertebral regions of it remain cartilaginous. Each intervertebral cartilaginous ring is overlapped by the osseous vertebral rings: but the overlap of one does not meet the overlap of the next, so that the middle of the intervertebral cartilage ring remains unprotected. A strand of migratory connective tissue cells grows into the cartilaginous perichordal ring in a caudal to cranial direction forming a complete arc through the interspace between the two successive hour-glass-shaped centra, and then a split appears within the line of this arc of connective tissue cells, thus forming a synovial cavity. The intervertebral cartilage is divided into a ball and socket; the ball articulates with the front end of a vertebra and the socket with the posterior end of the previous vertebra. The connective tissue cells lining the synovial cavity become cartilaginous, forming the surfaces of the ball and socket. So each vertebra has a ball in front and a socket at the back forming an ophisthocœlous vertebra.

Graham Kerr[7] has stated that the intervertebral cartilage in Urodela increases considerably in thickness, bulging out between the adjacent somewhat expanded ends of the bony tube. The statement of Graham Kerr is incorrect as one could easily see that in an early stage these migratory connective tissue cells are outside the intervertebral cartilage and at a later stage they could be seen migrated within the intervertebral cartilage.

In *Necturus maculatus* an almost identical condition can be seen with certain modifications. After the formation of the hour-glass-shaped centra and the cartilaginous intervertebral rings, the migratory connective tissue cells instead of getting in an arc, go inside it at right-angles to the rings. These connective tissue cells soon become a ligament. A transverse section through the anterior region of the intervertebral cartilage of the trunk region of *Necturus maculatus* at 48 mm. stage, shows the cartilaginous cells outside the notochordal sheath which is surrounded by the osseous ring of the hour-glass-shaped centrum which overlapped on the intervertebral cartilage (Fig. 1). A section passing through the middle region of the intervertebral cartilage which remains unprotected, clearly shows that the migratory connective tissue cells have entered inside the intervertebral cartilage and have constricted the notochord considerably.

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[1] Gadow, H., *Phil. Trans. Roy. Soc.* (B), 1896, **187**, 1-57.

[2] Schauinsland, H., *Handbuch der vergl. u. experim. Entw-lehre der Wirbeltiere. von Osker Hertwig*, 1906, 3, 339-572.

[3] Kingsley, J. S., *The Vertebrate Skeleton*, 1925, 38.

[4] Goodrich, E. S., *Studies on the Structure and Development of Vertebrates*, 1930, 51.

[5] Mookerjee, H. K., *Nature*, August 4, 1934, **134**, 182.

[6] Mookerjee, H. K., *Phil. Trans. Roy. Soc.* (B), 1930, 218, 415-446.

[7] Graham Kerr, J., *Text-book of Embryology*, 1919, **2**, 299.