

Some observations regarding the burrows of juvenile *Nephrops norvegicus* (L.)

by

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The Behaviour of *Nephrops* in the Glass Receptacle

There were found two specimens of *Nephrops* with the length of 2,2 and 2,7 cm in the Kvarner region, on 26th of August 1961. A layer of sediment thick about 3,5 cm was put in the round receptacle of 5 liters, then the receptacle was filled with sea water. When the water became clearer both specimens were transferred into the mentioned receptacle. I could not notice any change that day except that both specimens were moving very fast round the edge of the receptacle. Next morning there was an intersection of the tunnel at the edge of the wall with three openings and the specimens with the length of 2,7 cm. Measuring by the circuit of the receptacle from the outside edge of the first opening, the length of the tunnel was 8,5 cm and the outside edge of the third opening 16 cm. The excavated tunnel was large enough for *Nephrops* to move freely. Regarding the first pair of pereopods the turning was done very skilfully. I could observe the selecting of the ooze under the third opening of the maxilipeds. Nutritious substance it casted over to the mouth opening while the particles which did not serve as food were casted toward the abdomen. Occasionally it made very fast motions with its pleopods. It caused the current of water in the tunnel. The clear water entered through the third opening and through the first opening came out the muddy water. The larger particles, that had not been taken away by the current, were brought out to the surface through the first opening. It turned and with its first pereopods it drew the ooze by both sides and with the maxilipeds by the lower side. The ooze drawn like that, it pushed in front of it, bringing it out to the surface. It left it on the immediate remoteness from the first opening forming a crater. From the first opening toward the bottom of the glass receptacle viz. The lowest point in the tunnel, there was a slope of about 20 degrees, while the other of about 1 cm diameter standed vertically, and the third was under the major slope. After about 16 hours that this specimen had live in described way in the glass receptacle, I dug through the ooze looking for the minor specimen. I found it dead with the first pair of pereopods broken off and the abdomen half cut.

In the North part of the Velebit channel was caught a spemen with the length of 2,8 cm on 29th of July 1963. About 17 hours later it was transferred into a glass receptacle with the ooze. First it circled along the edge of the receptacle, then it began to burrow. The next morning it had two openings in the middle of the receptacle with the distance of 12 cm between them. The openings were completely identical with the photo brought by H. BARNES and T.B. BAGENAL [1951]. The same day i.e. on 30 July it was transferred into a quadrilateral basin with dimensions 25 × 15 cm. It began to dig the tunnel immediately. After five days it was working on the fifth opening. During those days *Nephrops* was staying in the tunnels, but occasionally the muddy water came out through the first opening and *Nephrops* itself also came out drawing the ooze only through the first opening, as it is described in the first example.

In the bay of Rijeka a specimen of about 3 cm was caught on 26th of August 1966. It was put into a glass receptable with a diameter of 10 cm. On 5th of September it was transferred into a quadrilateral basin with dimensions 34 × 21 cm. The layer of sediment was 16 cm thick. It dug several tunnels and openings and it behaved as it was described previously.

Discussion

The mentioned specimens of *Nephrops* have dug the openings with craters and without them and the tunnels in the bed completely identically although they had been caught in the different localities over

the period of five years. The conclusion may be that they have behaved with inborn, instinctive manners in the improvised surrounding of the glass receptacle and basin as they do in free nature.

The life of the juvenile *Nephrops* is running exclusively in tunnels. This conclusion may be drawn according to the date of one year's investigation of the channel region 1957/1958 M.V. *Bentos* when from the totally caught 11 342 specimens of *Nephrops* only nine belonged to the middle lowest class length of 5,5 cm. The mentioned specimens caught by the Petersen Grab confirm that the juvenile *Nephrops* lives in the same bed with the adults.

If the tunnels served to *Nephrops* only as the refuge then *Nephrops* would in a short term dig a system of tunnels and it would have no reason to go on digging. The observations made on the fourth specimen show that *Nephrops*, even after a month, continuously makes new openings and tunnels covering those already made. We can notice that *Nephrops*, selecting the ooze on the way described, is searching for food. Through this aspect it is possible to understand the problem of the nourishment, which was brought forth by H.J. THOMAS and C. DAVIDSON [1962].

Two kinds of openings can be distinguished on the surface of the bed : one, with the crater around it and the less slopy declivity, and the other with a more vertical slope, without the crater. As it is described before, the craters arise from the selected ooze brought out to the surface by *Nephrops* through the opening with the minor slope. The vertical opening without the crater is used for the circulation of water. By the occasional moving of pleopods it is possible for *Nephrops* to make water circulate viz. to cause the current of water. In this way, during the selecting of the ooze, it keeps water clear and fresh what is of great importance for its respiration.

The way of life of *Nephrops* brought forth in the mentioned examples shows us why it is connected with a clayey and loamy bottom and, in the same time, we can understand why *Nephrops* cannot be found outside of that mentioned region where sandy, hard bottom spreads. The extension of the clayey and loamy bottom conditioned that the population of *Nephrops* in the channel region is geographically isolated. According to this *Nephrops* is a narrowly connected kind of its determinate substratum and as such is a characteristic animal for the community of the clayey and loamy bottom.

Conclusion

The post-larval stages and juvenile formes of *Nephrops* live in the muddy bottom (clay, loam) digging tunnels. They have two types of openings : less slopy with craters and more vertical without craters. *Nephrops* looks for food selecting the ooze in a determined direction. The selected ooze it throws out through the less slopy opening round which it makes a crater, or it covers with it the previously dug tunnels and openings. It builds a system of tunnels not only for refuge but also in the search for food. The vertical openings serve for the circulation of water. It is obtained by the occasional but very fast moving of pleopods. The circulation of water has a double purpose : the cleaning of the tunnel of the muddy water which is the result of selecting the ooze, and the coming of fresh water which helps and assures the normal respiration of *Nephrops*.

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