

THLENNMANN, A. (1950)

The transport of aquatic animals by birds.

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Translated by P. L. Nock

2. The Transport of Aquatic Animals by Birds.

A great deal has been written on the part which birds play in the dispersal of freshwater fauna. ZSCHOKKE (1900, S. 369-375) has gathered together the literature on this subject. We follow him (in parts literally) and supplement his data.

Resistant stages of Protozoa, Bryozoa, Spongillae, Crustacea, Rotatoria, in addition to molluscs (eggs and adult animals, especially species which occur abundantly on the surface of the water) (BROCKMEIER 1896, 249) and all kinds of worms, perhaps also occasionally amphibians and fish (eggs), are carried in the plumage and on the feet and legs of aquatic birds. Cladocera eggs, statoblasts of Plumatella, cysts of infusoria, and Ostracoda were directly observed on the bill, feet and plumage of migrating ducks. Nematoda and Philodina could be taken from the particles of mud clinging to the birds. One swan was completely covered with statoblasts. Polycelis nigra was carried by Fulix fuligula, F. nyroca and Anas boschas, Glossosiphonia complanata by Mareca penelope and Anas boschas, Plumatella repens by Ardea cinerea. Sphaerium cornum was found clinging to the foot of a snipe (illustration of NUSSBAUM-KARSTEN-WEBER, 465), and pond mussels on the webs of ducks. The migratory duck with the recent spawn of a freshwater snail on its foot, which Tristram shot in the Sahara, at least 100 English miles from the nearest freshwater, has become famous (l.c.p. 465). It has been established through experiments that the spawn of frogs and toads can also remain in the air in smaller amounts for up to four days in a low temperature and misty weather, without its capacity for development incurring serious damage, and so the conditions for spreading are favourable. (HESSE 1924, p. 56). And FR. SCHIEMENZ (1925) showed through experiments on stickleback eggs, that such fish eggs are not so delicate that they cannot be spread by aquatic birds. Indeed, fish eggs (pike and perch spawn) have also been found clinging to aquatic birds (SCHIEMENZ). KAMMERER (1907, p. 521) bred, among other things, two examples of the small carp Cyprinodon fasciatus out of Adria mud which had lain dry for two weeks. Thus the eggs of this fish can also be spread by aquatic birds, without their capacity for development suffering by it. In addition, Cyprinodonts live in most constricted and remote waters.

The present-day distribution of freshwater fauna provides indirect evidence for the role of transport by birds. In this way, according to D.E. GUERNE, the colonisation of the freshwater basins of the Azores is partly explicable. Santa Maria, one of the smallest and driest islands of the Azores, lying nearest the coasts of Europe and Africa and offering a natural resting-place to migrating birds, according to DE GUERNE owes the presence of northern entomostraca, such as Cypris bispinosa and Diaptomus serricornis LILLJ., to water fowl. (For further examples see ZSCHOKKE). Also the distribution and composition of the high alpine water fauna argues for, and not against, the widespread aid of this transport (ZSCHOKKE). As evidence for spreading in the entire region of the Dauphine by birds of passage, KEILHACK and others put forward the diffusion of Acroperus harpae and Polyphemus pediculus (PESTA 1929, p. 127).

SCHRODER (1923) directly views wading birds - and amongst these probably wild ducks - as the most important factor in the spread of limnetic organisms in the colonisation of newly-made reservoirs. The appeal which the wide surfaces of water in reservoirs have for birds of passage is known to be great. In this way the crustacean Holopedium gibberum was introduced into the reservoirs of Klingenberg and Bergen (Saxony); in 1918-20 MAX VOIGT showed it to be present there.

The planktonic crustacean Eurytemora velox LILLJ., characteristic of the waters of the North German lowland, only penetrates up the Rhine in unstable colonies, at times further south, spread by water birds (the island of Nonnenwerth in the Middle Rhine, Pool of the Altrhein Stockstadt-Erfelden on the Upper Rhine) (LAUTERBORN 1918, p. 71).

The boreo-alpine crustacean Bythotrephes was spread in only 30-year-old Silesian quarries.

When freshwater snails such as Limnaea ovata DRAP. occur on the Halligen, those small islands in the Wattenmeer, it is very probable that they have been introduced by ducks (DEGNER 1924).

That the snail Pyrgula annulata, otherwise native to the upper Italian and Dalmatian lakes, has recently occurred in four small lakes in Trentina (Cavedine, Toblino, S. Massenza, Tenne) is attributed to transport by aquatic birds (PIERSANTI, according to BURCKHARDT 1941, S. 216).

Also animals, whose distribution we can in general understand only by the assumption of active migration on their part, are spread by birds in exceptional cases. Thus the incidence of Planaria alpina and Polycelis cornuta (which in general are not transported) in a small stream which flows into the Laacher See (Eifel), which has no outlet, by the abbey of Maria Laach, is according to WALTER VOIGT'S view (1910) explicable only through

transport by birds; aquatic birds visit the large, open lake in great numbers. Also in about 1937 Polycelis cornuta (fissipara) was carried from a spring in the Kellerssee in Holstein to one in the neighbouring Dieksee (THIENEMANN 1949 a).

Finally WEIGOLD (1910) established that the chydorid fauna of the ponds and meres of Saxony are richer in species, the more these waters are visited by migrating birds. In his experimental area it was clearly recognisable that "the settlement of isolated waters by Chydoridae takes place almost exclusively by transport on the part of birds and is continual process." He remarks of Chydorus sphaericus (p. 109): "Apart from wild ducks, especially Anas boschas and querquedula, the coot and moorhen Fulica atra and Gallinula chloropus especially become potential carriers. Then after these the Totanus species, Tringoides hypoleucus, Charadrius dubius, the wagtails, Motacilla alba, come under consideration next to still a few other rarer beach birds, which along with the above-mentioned prefer to run about on mud and in shallow water, and thereby spread the small ehippia with the mud at the places where they congregate. In the case of web-footed birds, however, it is more a question of plumage, on which the eggs of groundlings are caught up between water plants. I suppose that it is just the sandpipers, the wide-ranging Totanidae, which have up to now been underestimated as "falsifiers of fauna". It should also be explicable through transport by birds that the purely northern cladoceran Limnospira frontosa G.O. SARS suddenly appeared in the ponds of South Bohemia near Nauhaus, but thereupon immediately disappeared again (SPANDL 1927, p. 69). ARNDT (1928, P. 163) attributes the appearance of the sponge Heteromeyenia ryderi on the Faeroes to introduction by birds of passage from the British Isles.

Aquatic animals, however, can be spread not only via the body surfaces of birds. ZACHARIAS has already bred amoebae, infusoria and Ostracoda from the droppings of seagulls. In one remarkable case HILBERT (1919) notes that, "even large water snails can be swallowed (by water birds) and then removed alive out of the animal's crop through regurgitation. Three years ago (1915) an acquaintance of mine shot a duck on the Pregel near Königsberg i. Pr. - a duck whose crop contained eleven large, adult specimens of Paludina fasciata MULL, which were all unharmed and lived protected by a tightly closed cover. A living specimen of the snail Hydrobia ulvae PENN. was found in the crop of a sandpiper (Calidris maritima BRUNN.). It often happens that an aquatic bird which has been shot vomits up the contents of its crop, so that snails, which had previously been taken and which are still just about alive, gain their freedom again (BOETTGER 1931, p. 273).

HUITTELD-KAAS (1924, pp. 235, 236) mentions the widespread distribution of fish by fish-eating birds such as "Lumme"*, seagulls and ospreys, etc. It is not impossible that when foraging the parents let a fish fall here and there, pursued by a bird of prey of busy foraging for themselves. Such an isolated instance naturally could not be significant for the general picture.

3. Transport of Aquatic Animals by Insects.

Flying insects also serve as vehicles for aquatic animals. The snail Ancylus has been repeatedly found fastened to the wing cases of beetles (e.g. Colymbetes). Small mussels have also been found already adhering to insects; a water-beetle (Dytiscus marginalis) carried a Sphaerium on its legs, a water-bug a pea-shell (Pisidium). Ostracoda (Cyclocypris laevis, serena) were spread by flying aquatic insects (such as Notonecta glauca). Small specimens of Gammarus were carried by Dysticus, and water beetles and water-bugs are vehicles for vorticellae and Carchesium (ZSCHOKKE *900, S. 375; HESSE 1924, S. 56).

Water-mite larvae are transported regularly by flying insects, on which they are parasitic. In 1937 MUNCHBERG gave a survey "on the parasitism of water-mites on flying insects", to a great part on the basis of unique, voluminous and painstaking experiments (further literature in this work). Larvae of Arrenurus and Georgella species are parasitic on dragonflies. Other Arrenurus species are attached to Chironomidae and Culicidae; Arrenurus larvae have also been found on water beetles (Hydrophilus). Hygrobatas longipalpis larvae live on Chironomidae and Corethra; the same goes for Diplodontus despiciens, whose main host is Corethra. Chironomidae are also parasitised by the deep-water Hydracarina of our North German lakes, Huitfeldia rectipes, as well as Piona conglobata. Thyasinae prefer semi-aquatic Tipulidae, but also occur on other, partly genuinely aquatic Diptera. Water-mite larvae are further known from Plecoptera and Trichoptera. The possibilities for the spreading in stagnant water of Hydracarina, whose larvae are parasitic on flying insects, are of course much better, than those of the species without larval parasitism, which therefore can actively migrate only on water.

In the small basin in a garden at Plon, mentioned on p. 143, during the four years of observation, 18 species of Hydracarina, that is 18% of the macroscopic animal species observed overall in the basin, were introduced by flying insects (midges/gnats/mosquitoes) (THIENEMANN 1948).

Notice

Please note that these translations were produced to assist the scientific staff of the FBA (Freshwater Biological Association) in their research. These translations were done by scientific staff with relevant language skills and not by professional translators.