Szidat, L.: On connections between Parasitology & Ornithology, Der Vogelzug, 13, no.1/2, p.17, 1942, - pp.23-27: -

From comparative examinations, carried out by the German investigator of ectoparasites, H. Fahrenholz as early as 1913 particularly on Anoplura of Anthropoid Apes and Man, and, after that, also by Kellog and Harrison (1914) on Mallophaga of Birds, as well as by myself (1939) om Trematoda, it is seen that there is a high degree of probability for this assumption, viz. of adaptation by parallel evolution between hosts and their parasites throughout millions of years. One may even assume that, for certain groups of parasites, this parallel evolution has started already in the earliest ancestral Vertebrates, and that subsequently in the course of splitting-up of the evolutionary line of Vertebrates into classes, orders, families, etc., the corresponding line of parasitic organisms has undergone a similar process of splitting-up into systematic subdivisions, - in such a manner, that descendants of the earliest ancestral parasites are found even presently in the most different classes,,orders, families, etc., of the Vertebrate hosts. (For more details, see Szidat 1939.)

Recently, Wolfdietrich Eichler (1940) summed up this correlation in the evolution of hosts and parasites in two rules. According to the first("Fahrenholz's rule"), "one can, as far as permanent parasites are concerned, mostly draw conclusions from the systematic relationship of the parasites, immediately as to the relationship of the hosts". Further, particularly from my own papers (1934, 1936, 1939) it can be concluded also, that the lower or higher level of organisation of the hosts is reflected in a lower or higher level of organisation in the structure of the parasites, - from which W. Eichler constructed his so-called "Szidat's rule", viz. that "one can, as far as permanent parasites are concerned, mostly draw conclusions from the level of organisation of the parasites, immediately as to the relative phylogenetic age of the host".

Thus the parasites, from critical point of view, form an extremely valuable ressource for systematic investigations into the evolution of the Vertebrates, and particularly of the birds. Of course, it became manifest that juvenile host organisms may sometimes harbour parasites, which are not peculiar to their own species, - a fact, which I emphasized as early as in 1939. However, explanation is given also for these observations, viz. by Th. Mollison's highly interesting and valuable findings. This author found out that proteins, peculiar to the species, are formed not earlier than in the course of ontogeny, and that in the juvenile stages the chemical synthesis of phylogenetically earlier phases is repeated (in a shortened manner, of course), - similarly to morphological differentiation, as characterized by Haeckel's well-known Basic Law of Biogenesis.

Applying Fahrenholz's idea consistently, Harrison emphasized, as early as 1914, the possibility of using Mallophaga as an expedient for tracing the evolution of the Birds. As a first example, he finds in this way that the Kiwi (Apteryx) is linked with the Ralli, and thus certain correlations, conjectured already by Fürbringer (see Stresemann 1934), are rendered very probable, to a certain extent. Short time ago, W. Eichler supplied an additional, highly impressive instance, showing the value of parasitological results, as to judging evolutionary relationship in orders of Birds with isolated position in the system. He says, "Formerly, the duck-like bill in the Flamingoes was considered to be due to convergence, and evolved in these Gressores (relatives to Storks and Herons) in adaptation to their habits. A more recent anatomical investigation of the Flamingoes, however, leads to the conclusion that, on the contrary, Ducks and Flamingoes must be primarily related one to the other, and, moreover, the gressor-like legs in the Flamingoes must be a specialization, convergent to that in true Gressores. Here, the decision can be made parasitologically: in Ducks (sensu latiore) 3 characteristic genera of Mallophaga occur - from each genus one representative nearly on every Duck-species - , and these genera, viz. Anaticola, Anatoecus, and Trinoton, occur, apart from Ducks, only on Flamingoes. On the other hand, no genus of Biting Lice, typical of Storks and Herons, is represented on the Flamingo!" (1941.)

By detailed investigations into the parasites of Storks and Herons, carried out in 1941, I myself could render it probable that the Herons are not as closely related to the Storks, as laid down in the system, where both types are lumped in the order of Gressores. Differently, the Herons appear, as seen from parasitological results, to be much more closely related to the Diurnal Predaceous Birds (Accipitres), for which relationship the parasites of Storks do not supply any evidence. However, these investigations, although having yielded so far interesting results, are, at present, but probing steps on ground hardly made accessible. My opinion, of course, is that this subject of research, if dealt with more intensely, will lead to an incomparably greater amount of details, useful for working out the system of Birds, which is still so unsatisfactory.

In the course of work on parasites of Storks and Herons, an additional problem of importance to the ornithologist was approached, viz. that of the origin, and original habitat, repectively, of certain Bird groups with wide geographical range. According to Mayr and Meise (1930), solution of this problem is possibly of great importance, in connection with questions of bird migration, for the student particularly of the European Avifauna. There is great probability that on this very continent most birds, having been resident prior to the glacial epoch, were destroyed by that catastrophe. On the other hand,

the majority of the species occurring presently on this territory has gradually entered it, after the continental ice-masses had withdrawn, from those stretches of land, which had no ice-cover at all. In this connection, data about the original geographical range of the single species, which had entered after the withdrawal of the ice, would be highly conclusive also as to the present state of bird migration, the direction of the latter being by no means identical for the different species, these data might also serve to answer the question whether those original routes, leading to re-population of areas, and the directions of present bird-migration are identical. Beyond this, answer could possibly be found also to the quest for the territory, where the larger systematic groups of birds have started their evolutionary steps. It is possible that, also here, parasitology with its modern methods can contribute much to elucidation about these items.

Possibly, this line of research might provide means, complementary to the palaeontological foundations of ornithology, as considered feasible and desirable by the German author Ihering in his inspiring paper about "The Helminths as a Ressource for Zoogeographical Research" (1902). According to him, "Helminthology, approached in this sense, becomes also object of palaeontological research, since relationship of the Helminths" -- and to-day, in wider sense, we could say that of all parasites - "to their hosts, as well as to the migrations and the geological age of these hosts, lead to exact insight into the age of the larger systematic groups (of hosts), even of their genera and species".

Of course, to fulfil Ihering's wishes, even nowadays much better knowledge of the parasites, harboured by the single hosts, and their position in a natural system, is needed: details available at present are too often far from being as exact as wished for and as reliable as necessary. Hence the great importance, always to be emphasized, of better knowledge of the species and detailed work on the system.

For years, I myself have taken trouble to work out a natural system of Trematoda. This system is to have the advantage, as compared with that of many other groups of parasites, that the free-living juvenile stages of the Trematods, the Cercariae, are much more conservative in retaining their shapes than their adult stages, and in this way provide clues for the establishment of natural groups, like orders, suborders, families, etc., On the other hand, the Echinorhyncha, considered by Ihering (1902) to be particularly fit for being worked on, according to his ideas, do not appear to fulfil this requirement, owing to their comparatively low degree of host-specificity alone, as pointed out by Fuhrmann (1908).

The paper on Trematoda, as well as on the remainder of parasites in Storks and Herons, published by me in 1940, gives rise to the assumption that the Storks have their centre of origin and evolution in the big swampy territories of Central Africa, where also relatives of the

parasites in Storks occur in a bigger number of species and from where they have spread towards all geographical directions during long periods. On the other hand, the species parasitizing Herons, which (as mentioned above) do not show the least connections to those harboured by Storks, point towards a centre of origin of this group of birds, to be looked for in the big swampy stretches of South America. From that latter territory, the Heron group may have spread subsequently also over big territories, and very often in a direction opposite to that followed by the Storks.

From this, it does not appear to be devious by any means, to correlate the direction of the autumnal migration of the Storks and the Herons with that supposed location of the original geographical ranges of these two systematic groups, respectively. As it is well-known, the Storks migrate in autumn southwards over Central Africa. The Herons, on the other hand, aim in southwesterly direction towards those parts of Africa, which, according to Wegener's Theory of Continental Dislocation, represented the last land-bridges between Africa and the South American continent, drifting away. In this case, the direction of the autumnal migration is possibly controlled by the last "impressions on the memory", caused by the direction of the route of immigration (into the post-glacial palaearctic region). This is also the conception professed by many ornithologists.