A FURTHER ECOLOGICAL STUDY OF THE RIVER RHEIDOL: THE FOOD OF THE COMMON INSECTS OF THE MAIN-STREAM

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(With 2 Figures in the Text)

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1. INTRODUCTION

The Rheidol, which flows into Cardigan Bay, is a good example of a swift, stony river of medium size. A number of papers have appeared, dealing with its history of pollution (Carpenter, 1924, 1925; Laurie & Jones, 1938; Newton, 1944), and recently the writer (1949*a*) has published a general account of the river describing the fauna of the main-stream and the backwaters, together with physiographical data. The present paper deals with the feeding habits of the characteristic insect species of the main-stream and is based on the examination of the gut contents of about 1300 specimens.

2. THE CONDITIONS OF EXISTENCE

The general environmental conditions of the fauna have been discussed in the earlier study (Jones, 1949*a*, pp. 67–78) and may be summarized as follows. The main-stream has a total fall of about 1750 ft., a length of about 28 miles and is for the most part about 100 ft. in width. The river draws most of its water from peaty land over 1000 ft. in altitude—the west and north-west slopes of Plynlimmon, and throughout its course, in many respects, has the general character of a large mountain stream. The water is very soft and acid, its pH varying from 6·4 at low level to 5·8 at full flood. The current is swift, exceeding 5 ft./sec. on the riffles even when the level of the river is low. Floods are frequent and violent; at full flood the level of the river, near Aberystwyth, rises about 2 ft. and the mid-stream current is nearly 6 ft./sec. In its upper reaches the stream-bed is largely rocky; in its lower reaches the bed is composed of pebbles and gravel and is very unstable so that the course of the river is continually changing. The river water is well oxygenated, but its turbulence permits only a small degree of supersaturation; the highest oxygen concentration recorded, on a sunny, spring day when the river bed was covered with green algal growth, is only 101·8%. Temperature conditions are favourable; the river rarely freezes and on cool, sunny days the water may be 2–3° C. warmer than the air. After many days of hot sunshine, however, the water temperature does not exceed 22° C.

In 1931–2, when the faunistic survey of Laurie & Jones (1938) was made, the river was still very slightly polluted with lead, carrying about 0·1 mg. Pb/l. in solution at full flood and 0·02–0·03 mg./l. at normal or low level. At this time there was no evidence that the pollution limited the invertebrate fauna to any degree, and during the last 17 years there has been at least no deterioration in the river's chemical condition; it has now been stocked with trout and the fishing is protected. There is no appreciable amount of sewage pollution, for its valley is thinly inhabited.

The insects of the river have few enemies apart from predatory members of their own group, the trout (*Salmo trutta*) and Hydracarina. Leeches are very rare in the main-stream and there are no large Crustacea. Newts are extremely rare; the stickleback (*Gasterosteus aculeatus*) occurs in fair numbers in the lower reaches of the river, mainly in the backwaters, but there are no other insectivorous fish such as the loach, gudgeon or bullhead, and eels are