PHENOTYPIC VARIABILITY OF THE INTERTIDAL ISOPOD
IDOTEA GRANULOSA RATHKE IN THE IRISH SEA

BY

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INTRODUCTION

Idotea granulosa Rathke, 1843 is an intertidal isopod, great numbers of which occur on fucoid beds and in their understory algae on Northern Atlantic rocky shores (Naylor, 1955; Healy & O’Neill, 1984; Salemaa, 1986a). Two functionally different pigmentary mechanisms are responsible for the outstanding colour variation of the species:
Lee (1966) examined the colour variation of *I. granulosa* and found that the red, green and brown variants of the species are produced by integumental carotenoids and their protein complexes derived from the ingested algal material.

Polymorphism in the pattern of melanophore free light patches and stripes is also a typical feature of the coloration of the species, as well as of most of its congeners (Koepcke, 1948). In fact, Rathke’s comment “superiore corporis facie granulosa” tells us that the variability of chromatophore pattern figures in the original description of this isopod (Rathke, 1843: 23), and it is even included in the Latin name of the species, *I. granulosa*.

*I. granulosa*, which both resides among algal growths and feeds on them, has well developed ability to alter its colour and thus produce a rapid response to blend in with its heterogeneous background coloration. Already as early as 1931 Remane observed that the phenotypic composition of *I. granulosa* displayed remarkable small-scale geographic differentiation. The population samples collected from *Fucus* vegetation were mostly uniform in colour, whereas animals residing on growths of red algae had a more or less marbled appearance due to dorsal spotting and striping. This was also found by Salemäa (1986a) while studying the ecology of *I. granulosa* in the Irish Sea. Questions on the functioning of the colour variation and its causes were aroused because frequencies of the colour variants seemed to parallel the demographic structure of *I. granulosa* populations.

The present study is a basic description of the range of phenotypic variation in *I. granulosa* populations on the rocky shores of the Isle of Man. The interplay between colour polymorphism of the species at different phases of its life cycle, and the surface texture of its background habitat will also be examined.

**MATERIAL AND METHODS**

During the investigation of the distribution and breeding biology of *I. granulosa* on the rocky shores of the Isle of Man (Salemäa, 1986a) population samples were collected throughout one year (from 19 January 1978 to 19 February 1979) from the intertidal growths of *Ascophyllum nodosum* (L.) Le Jol., *Fucus serratus* L., *Gigartina stellata* (Stack.) Batt., *Laurencia pinnatifida* (Huds.) Lamour., *Corallina officinalis* L. and *Cladophora rupestris* (L.) Kütz. Animals associated with these fucoids and their understory algae were removed by careful washing. The idoteid material obtained was stored in 70% ethanol. The colour phenotypes, based on the integumental chromatophore configurations, were scored from animals longer than 3 mm in size (1 mm size classes from 4 to 23 mm). Altogether 164 population samples (comprising a total of 10,870 individuals) were collected on five rocky shores around the southern parts of the Isle of Man. The sampling sites were: (1) A fully exposed rocky shore inside Port Erin breakwater, (2) rocky and boulder reefs in Port Erin