Preliminary Report on the Surtsey Investigation in 1969 and 1970 Terrestrial Invertebrates

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FIELD WORK IN 1969

We did not visit Iceland in 1969. However, the well-known naturalist Hálfdán Björnsson, Kvísker, stayed on Surtsey during two periods this summer, from end of April to mid May, and again in September. He made extensive collecting of insects which have been put at our disposal. Stray specimens were captured by other visitors.

As far as identified, the material from 1969 contains 9 species not previously recorded from Surtsey: *Clinocera stagnalis* Hal., *Hydrellia griseola* Fall., *Leptocera lutosa* Stenh., *Parascaptomyza pallida* Zett., Diptera; *Enicmus minutus* L., *Otiorrhynchus arcticus* O. Fbr., Coleoptera; *Plutella senilella* Zett., *Pyrameis cardui* L., Lepidoptera; *Arctocorisa carinata* C. R. Sahlb., Hemiptera.

With these additions the total number of terrestrial Arthropods observed on Surtsey raised to 80 species.

The weevil *Otiorrhynchus arcticus* was of special interest because it is flightless and must have arrived by hydrochorous transport. Three specimens were found on the shore by Hálfdán Björnsson, of which two were dead but one alive. As described in our report for 1968, *Otiorrhynchus arcticus* may be able, under favourable circumstances, to survive exposure to seawater, at least if carried in a grass-tussock. For this reason a series of experiments on the effect of such exposure upon two species af flightless weevils (fam. *Curculionidae)* was performed in August 1970, in Reykjavík. Besides the *Otiorrhynchus*, also *Barynotus squamosus* Germ. was used; these are the two most abundant weevils on Heimaey.

5 *Otiorrhynchus* and 4 *Barynotus* were brought into each of two glass-jars with seawater, of which one was left undisturbed whereas the other was shaken at uneven intervals. After a little more than 24 hours all 8 *Barynotus* and 4 out of 5 *Otiorrhynchus* in the disturbed jar were at the bottom; but all 5 *Otiorrhynchus* in the undisturbed jar were still floating. After shaking, at h 38, also 4 of these sank. All 18 specimens were then dried on filter paper but only 2 *Barynotus* and 1 *Otiorrhynchus* seemed to recover to normal motility, all from the un-shaken water sample. 6 motionless *Otiorrhynchus* (3 from each jar) were watched for another 24 h day without showing any sign of life. The conclusion is that these weevils can hardly endure long-distance sea transport without attaching themselves to floating subjects.

FIELD WORK IN 1970

Our group was extended to include also a micro-zoologist, Dr. Birger Pejler, Uppsala University, who worked in close co-operation with the algologist, Dr. G. H. Schwabe, Plön (West Germany).

The field work was entirely devoted to Surtsey itself and lasted from August 5th through 11th. The weather was exceptionally good.

However, most of the material was brought together through continuous, daily collecting during most of the summer by an Icelandic student, Erling Ólafsson, who served as one of the guards on Surtsey and turned out to be a most skilful and ardent observer and collector.

In 1970 we introduced a new kind of screen-traps for catching flying insects. These are of simple construction and easy to handle but gave a better result than the previously used glue-traps. Our screen-trap consists of a transparent plastic sheet in vertical position. When bumping into this, the insects fall into a tray with water, to which has been added diluted formalin together with some detergent.

Also in 1970 Mr. Hálfdán Björnsson collected on Surtsey, 30.IV.–14.V.

Since the plans for publishing our experiences from the first seven years of Surtsey's existence are well advanced and the resulting book is probably going to appear in 1972, we restrict ourselves in this preliminary report to presenting a list of terrestrial invertebrates not previously observed on the island, and a few concluding remarks.

Additions to the Surtsey list of Terrestrial Arthropods, 1969–70.

INSECTA

Diptera

Fam. Chironomidae

Micropsectra atrofasciata Kieff. 12–14.VIII,70, 3 ex.

M. lindrothi Goetgh. 12.VIII.70.

Tanytarsus gracilentus Holmgr. 13.VIII.70.

Chironomus lugubris Zett. 21.V.70, 3 ex.

Psectroladius limbatellus Holmgr. 22.VIII.70.

Fam. Trichoceridae

Trichocera maculipennis Meig. 27.VI.70.

Fam. Anisopodidae

Sylvicola fenestralis Scop. 1.VII.70.

Fam. Tipulidae

Limonia autumnalis Staeg. 3–5.IX.70, 5 ex.

Erioptera hybrida Meig. 22.VIII.70.

Fam. Empididae

Clinocera stagnalis Hal. 28.IV.–13.V.69, 7 ex.

Fam. Syrphidae

Platycheirus clypeatus Meig. 27.VI.–7.VII.70, 3 ex.

Syrphus ribesii L. 16.VIII.70.

Metasyrphus lundbecki S.–R. 7.VII.70.

Phalacrodira tarsata Zett. 9–14.VII.70, 2 ex.

Melanogyna lasiophthalma Zett. V.VII.70.

Helophilus pendulus L. 11–14.VII.70, 11 ex.

Fam. Sepsidae

Themira pusilla Zett. 16.VIII.70.

Fam. Heleomyzidae

Neoleria prominens Beck. 16.VIII.70, 2 ex.

Fam. Sphaeroceridae

Copromyza nigra Meig. 27.VI.70.

Thoracochaeta zosterae Hal. 27.VI.70, 12 ex.

Leptocera lutosa Stenh. 1V.69.

Fam. Ephydridae

Discozerina bohemani Beck. 6–16.VIII.70,2 ex.

Philygria vittipennis Zett. 2.VII.70.

Hydrellia griseola Fall. 12–16.IX.69, 6 ex.; 11. VII.–17.VIII.70, 10 ex.

Scatella stagnalis Fall. 3–8.IX.70, 2 ex.

S. tenuicosta Coll. 20.VIII.70, 2 ex. bred from artificial body of fresh water.

Parydra pusilla Meig. 14.VIII.70.

Fam. Drosophilidae

Scaptomyza graminum Fall. 16.VIII.–3.IX.70. 2 ex.

Parascaptomyza pallida Zett. 16–17.IX.69, 6 ex.; 16.VIII.70.

Fam. Scatophagidae

Scatophaga villipes Zett. 7.VII.–19.VIII.70. 12 ex.

Chaetosa punctipes Meig. 14–15.VII.70, 2 ex.

Fam. Muscidae

Graphomya maculata Scop. 7.V.–16.VIII.70. 13 ex.

Fam. Anthomyiidae

Fucellia maritima Hal. 7.VIII.70, 2 ex.

Fam. Hippoboscidae

Ornithomyia avicularia L. 26.VIII.70.

Hymenoptera

Fam. Ichneumonidae

Meloboris collector Thunb. VII.–IX.70, 8 ex.

Promethes monticola Snell. 23.VII.70.

Campoletis sp. 2.VII.70.

Ophion sp. 18.IV.69, entire but probably dead cocoon, in drift.

Coleoptera

Fam. Coccinellidae

Coccinella undecimpunctata L. 26.VII.70, dead in drift.

Fam. Lathridiidae

Enicmus minutus L. 1969 and 1970, repeatedly in the house.

Fam. Curculionidae

Otiorrhynchus arcticus O. Fbr. V. 69, live specimen; dead, often fragmented specimens found repeatedly in drift 1968–70.

Barynotus squamosus Germ. 7.V.68, dead in drift.

Lepidoptera

Fam. Nymphalidae

Pyrameis cardui L. 11.IX.69, found dead but no doubt arrived alive.

Fam. Tineidae

Plutella senilella Zett. IV., V., IX.69; VIII.70.

Trichoptera

Fam. Limnephilidae

Limnephilus fenestratus Zett. VII.—VIII.70, 3 ex.

L. affinis Curt. 27.VI.70, dead in drift.

Hemiptera

Fam. Corixidae

Arctocorisa carinata C. R. Sahlb. Dead in drift.

Collembola

Fam. Poduridae

Hypogastrura assimilis Krausb. Repeatedly in 1970.

Fam. Entomobryidae

Vertagopus arborea L. IV. and VIII. 70, 35 ex.

ARACHNOIDEA

Araneida

Fam. Linyphiidae

Phaulothrix hardyi Bl. 8—9.VIII.70, 2 ex.

Fam. Erigonidae

Erigone sp. (young). 7.VIII., 22.VIII.70, 2 ex.

Acarida (incl. a few records from 1967 and 1968)

Mesostigmata

Arctoseius cetratus Selln. 10.VIII.70.

Dendrolaelaps oudemansi Halb. 14.VIII., 28.VIII.68.

Euhaemogamasus ambulans Thorell. V.70.

Haplolaelaps suecicus Selln. 7.VIII.70.

Lasioseius sp. 8—10.VIII.70.

Macrocheles subbadius Berl. 16.VIII.70.

Thinoseius fucicola Halb. IV., V.69; VII.—IX.70.

Trombidiformes

Cocceupodes clavifrons R. Can. 7—10.VIII.70.

Proteurenetes agilis Berl. VIII.70.

Pygmephorus mesembrinae R. Can. 11.VII.68, 13.V.69.

Rhagidia sp. 10.VIII.70.

Acaridiae

Caloglyphus regleri E. & F. Türk. 10.VIII.70.

Myianoetus vesparum Scheuch. VI., VIII.67.

Tyrophagus dimidiatus Herm. VII.68, VIII.70.

Ixodides

Ixodes uriae White. 9.VIII.70.

Total number of Terrestrial Arthropods known from Surtsey:

Insecta 112. — Arachnoidea 24. — Together: 136 species.

The entomological work on Surtsey in 1970 has supplied a most valuable material. It is large, in number of specimens as well as of species. For instance, from 1970 we have noted 55 species of Diptera — in spite of the fact that the material of some of the families is at present not, or only in part, identified — against 32 species for the second best year, 1967.

Thanks to the continuous collecting throughout the summer of 1970 it has been possible to correlate more remarkable samples with prevailing weather conditions during certain days. Preliminary analyses of this kind have provided some interesting hints. It is obvious that strong north winds (10-20 m/sec.) produce a particularly large and diversified material of immigrants. On the other hand, strong-flying insects, like many Diptera Brachycera, are also able to arrive by active flight during calm and sunny days.

COLONIZATION

It is highly doubtful whether the species of flies, *Leria modesta* Meig. in the first place, mentioned in the Progress Report III for 1966, did succeed to achieve more than a temporary colonization of Surtsey. They were stated to breed in carcasses on the shore but, due to the steadily increasing use of the beach as a resting place for gulls and other birds, which reached its maximum in 1970, practically all dead fishes and birds are now being devoured.

A more permanent colonization has, however, taken place in at least two species of insects:

(a) *Anisotoma besselsi* Pack. This was the first collembola to be found on Surtsey, in August 1967. It has since become very abundant, 517 specimens being collected in 21 samples. The species now appears to have become stabilized on the beach as a permanent resident. It is a pronounced halobiont and seems to be easily spread along the coasts and to islands, probably on the ocean surface itself. — It is possible that the same applies to *Isotoma maritima* Tullb., found in 10 samples, though with much lower abundance. Its biology is very similar.

(b) *Cricotopus variabilis* Staeg. This is, without any comparison, the commonest chironomid midge both on Heimaey and Surtsey. We were able to state, in August 1967, that the species on Heimaey breeds in rock-pools with high-salinity water. In August 1970 we found three larvae (identified by M. Hirvenoja) on Surtsey in small shallow pools on top of lava blocks close to the tidal zone, both north and southwest of the station. There is no reason to believe that this midge will disappear from the island.

MICROZOOLOGY

In collaboration with Dr. G. H. Schwabe soil samples were taken by B. Pejler from different localities on Surtsey in August 1970, especially on spots where vegetation of mosses and algae was found. After the return to Uppsala, the samples were inoculated, under sterile conditions, into plates with agar substrate and retorts with liquid culture medium. In most of these cultures algae have been developed, often also mosses, and in some microzoa have been found, especially from different localities in the crater of Surtur II, where eight taxa of naked amoebae, two shelled amoeboe, some ciliates and one bdelloid rotifer were encountered. A locality with moss vegetation S of Surtur I contained representatives of all the groups mentioned. Finally, the so-called *Scatella*-locality (in the gorge W of "New Year Crater") housed two naked amoebae and one ciliate. In the basins erected by Dr. Maguire diverse animals were observed; three monogonontous rotifers and one heliozoan were determined to species.

Drs. Elisabet and Lars Eric Henriksson, Institute of Plant Physiology, Uppsala, have investigated the nitrogen fixing of the blue-green algae from the soil samples and are preparing a paper on this subject, together with B. Pejler. One of his students, Mr. Olof Holmberg, is studying the variation, adaption to different substrates, behaviour and food selection of the naked amoebae of the cultures.

PLANS FOR THE FUTURE

It is our intention to visit Surtsey every second year in the future, with the main purpose of following the colonization, notably of developing vegetated spots.

A general idea of factors governing over-seas dispersal in the area seems already to have been achieved.

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