gedies of science is the slaying of beautiful hypotheses by ugly facts.

I must strongly advise those studying androconia for taxonomic purposes to disregard all deformed scales entirely; when many are present on a specimen it will be safest to transfer attention to another individual.

I am still convinced that Pierine androconia, difficult as they may be to interpret, are of high value in the study of relationships. We must be grateful to Mr Warren for taking these attractive structures and squeezing them very hard indeed to get the last drop of information out of them.

References

Bowden, S. R., 1955. Interrupted imaginal development: experiments on pupae of *Pieris napi* *Entomologist* **88**, 107-108

Bowden, S. R. and N. T. Easton, 1955. Diapause and death: further observations on imaginal development in *Pieris* hybrids. *Entomologist*, **88**: 174-178, 204-210.

Warren, B. C. S., -966. On the nature and origin of certain races of . . . . *Pieris. Entomologist's Rec. J. Var.* **78**; 57-65

Warren, B. C. S., 1970. Some aspects of hybridization and their significance. *Ibid.* **82**: 305-313.

Warren, B. C. S., 1971. Incomplete development . . . of scales . . . in specimens bred in captivity. *Ibid.* **83**: 147-148

Butterflies in Arctic Scandinavia, 1971

By M. R. Shaw

It has frequently been emphasised in the various entomological journals that collecting butterflies in the European Arctic is always something of a gamble. While it is potentially an immensely rich region, the onset of the entomologically brief summer season regularly varies by as much as two or three weeks from year to year, and in a manner which seems impossible to predict at a usefully early date. Also the weather is so notoriously unstable that several unfortunate would-be collectors making relatively brief trips have had to come back without seeing the sun. This year, my wife and I were able to take a complete month's holiday, which we felt would best be used in fulfilling a long-standing ambition to collect in the Arctic. With a whole month we were sure we would see something of at least the commoner butterflies, and we tried to arrange our dates so as to arrive in time for the early flying species, yet still be there when the later species started to emerge. From a survey of the literature it seemed to me that Abisko was on the whole a little later than the northern Norwegian fjords, and thus it should be possible to arrive at Abisko and collect "early" species for a while, then to move northwards towards the remains of the Gulf Stream at lower altitudes and find the "late" species flying perhaps a couple of weeks earlier than they would at Abisko.

Our collecting was confined to only two areas: Abisko (22.6.71-1.7.71 and 15/16.7.71) at 68° 23′ N. in Swedish Lapland, and Gargia (4.7.71-12.7.71) at 69° 48′ N. just south of Alta in the Norwegian province of Finmark. Even though we had no car, we were able to see something of all the exclusively Arctic butterflies as well as most of the boreal races of the more widely distributed species inhabiting the region. Our luck in this stemmed from several factors. Firstly, we had exceptionally warm and sunny weather and of the 25 days we spent in the Arctic we had only six wholly useless days, three of which were in any case to be spent in travelling between Abisko and Gargia, and really it was not until our last few days at Gargia that the weather stimulated bad language at all. Secondly the weather in the "Far North" had been better than average for the previous two summers, which had probably had a beneficial effect on butterfly populations since insects increase in numbers faster than their predators when conditions are good. Thirdly, at Abisko an early warm spring had been followed by a colder spell just before we arrived; this appeared to have the effect of condensing the season since pupae due to emerge during the poor weather were retarded, while the species which had still a few weeks before emergence seemed to be more influenced by the subsequent good weather (and perhaps by the prolonged warmth of spring), and so still emerged early. Lastly we met some very kind and helpful people—in particular Herr. Schlüter from Denmark and his family, whom we met towards the end of our first stay at Abisko. The Schlüters have specialised over the past decade in collecting Arctic butterflies, and we benefited enormously from their expert advice and knowledge. It was the Schlüter family who suggested that we abandon our rather vague and ill-defined plans to explore the Laxefjord (on reflection this would have been idiotic without a car) and visit Gargia instead, where we did extremely well. They also showed us a small but teeming locality in the hills behind Bjorkliden where we spent a most enjoyable and profitable day collecting together.

We arrived at Abisko on 22.6.71, and stayed in the Tourist-station (*ca.* 350 m.) until 2.7.71. Abisko is sufficiently well-known to need no further description, and much has been said about the inconvenience of the National Park (by some considered to be even more of a bane than the Arctic mosquitos), though in fact most of the really good collecting ground in the general area lies outside the Park. Mt. Nuolja is certainly a serious loss to the collector, but better high ground exists over the lake (where there is a mountain hut with bunks and cooking facilities) since *Clossiana polaris* Bdv., *C. chariclea* Schneider and *C. improba improbula* Bryk. all occur here, while only the last is found on Nuolja. As for the low ground, we found no need to go further than Abisko Östra about a mile from the hotel and just outside the Park, where a lot of easily accessible, varied and marshy ground is well popu-

lated with butterflies. Apart from the three trips to more specialised biotypes outlined below, we did all our collecting at Abisko in that direction, and did not find it necessary to cover large distances.

The mosses at Stordalen were visited on 23.6.71 and we were fortunate in finding *Erebia disa* Thnbg. in much better numbers than appear to have been noted previously. We saw the first few at about 10.00 a.m. in blazing sunshine, keeping very much to the wet and inaccessible parts of this large and wild expanse of marsh, moss and lakes, where they were almost impossible to catch. As the day wore on, but not until we were wet through, they flew freely all over the moss, and since both sexes were fresh and fully out we had no trouble in selecting an adequate series. We probably could have caught a couple of hundred had we so wished, and it was our first indication that we were lucky both with the season and with our timing to see this usually scarce insect in such profusion. It hazed over and became very humid at about 2.30 p.m., and although butterflies continued to fly we were driven off by the mosquitos. That, too, was a taste of things to come.

On 28.6.71 we went up Mt. Nuolja (by chair-lift to 900 m.) in rather uncertain weather, arriving at about midday. *C. improba* was quite common and very fresh by the lift-terminal but unfortunately by the time we had got out of the Park the sun had faded out and the wind became more descisive. In spite of these difficulties a short series of *improba* was taken, flying weakly in hazy sunshine but much more vigorously during the few moments of unbroken sun that we had near the edge of the Park. Not much else of interest was taken, though we caught several brief glimpses of various species kicked up into the wind and borne away. On the way up, in the shelter of the birch woods beneath the lift, we saw large numbers of *Erebia pandrose* Borkh., *Colias nastes werdandi* Zett., and *Pieris napi adalwinda* Frhst., all three species extending well above the tree-line, though the last did not quite make 900 m.

Our only other attempt at collecting above the tree-line during this period was made in the company of Herr. Schlüter and his family on 30.6.71, when they showed us their favourite spot in the hills behind Bjorkliden. Small calcarious outcrops at about 550 m. broke a high plateau and supported a good variation of vegetation and insects, but unfortunately we had picked a very windy day, and although the sun shone strongly and continuously we had obviously not seen the locality at its best. A couple of days previously Herr. Schlüter had caught two *Colias hecla sulitelma* Aur. (a very early date for this species at Abisko) and in previous years he had taken *Agriades glandon aquilo* Bdv. here. *Astragalus alpinus* was growing freely, and *C. nastes* was everywhere, apparently unimpeded by the wind. Four or five *C. hecla* were seen, but only two were caught, and Herr. Schlüter was extremely

generous in giving me the only *A. glandon aquilo* taken. *Pyrgus andromedae* Wallgrn. was common and fresh, and I also caught an early *Boloria napaea frigida* Warren.

The birch zone and bogs around Abisko Östra were very productive, and we saw plenty of *P. napi adalwinda, C. nastes, Clossiana euphrosyne fingal* Herbst., *Clossiana freija* Thnbg., *Proclossiana eunomia ossianus* Herbst., *Euphydryas iduna* Dalman, *Vacciniina optilete cyparissus* Hb., and *E. pandrose*, with smaller numbers of *Pyrgus centaureae* Rambur, *Oeneis norna* Thnbg., and *Clossiana frigga* Thnbg. As we left Abisko, *Colias palaeno* L., *Boloria sifanica* Gr.-Gr., and *Clossiana selene hela* Stdgr. were beginning to emerge. Our second visit to Abisko (15/16.7.71) is referred to later.

The journey by bus to Gargia, about 20 km. south of Alta near the Alta river, took two full days, and we stayed in the small Fjellstue, run by the Larsson family, from 3.7.71 until 12.7.71. Here we were received with great kindness and this phase of our holiday was especially enjoyable. Gargia (*ca.* 150 m.) is in the birch zone, though less firmly so than Abisko since in some parts quite extensive growths of fir were seen. To the south and within easy walking distance is the large hill Grönnasen (*ca.* 500 m.); beyond this the road winds away over a high mountain plateau which would probably be well worth exploring. The tree-line on Grönnasen is at about 400 m. and above this the vegetation is complex and varied, some parts being apparently calcarious with *Dryas octopetala* and *Astragalus alpinus* while other areas (mostly gneiss and quartzite) support a tangle of *Betula nana,* dwarf *Salix, Vaccinium uliginosum,* and a wide range of related berry-bearing plants (Ericaceae). Sizeable areas of the hillsides are marshy and furnish the usual bog plants and insects at rather lower densities than the lowland marshes, and several sparsely vegetated screes provide useful sun-traps. We confined our attention on the high ground near Gargia to south-facing slopes, and here we were able to find very good concentrations of some of the rarer Arctic specialities. In particular *Colias hecla* was in profusion between 400 and 450 m.. when it gave way to even larger numbers of *Clossiana chariclea.* It was a great thrill to see this normally extremely scarce Arctic fritillary so common, but although both sexes were fully out and fresh I could not discover the foodplant by finding females ovipositing. The *Oeneis* species on Grönnasen were also interesting, with *Oe. norna* occurring to about 450 m., being replaced higher up by *Oe. bore* Schneider. The presence of *bore* is often open to doubt when it occurs near populations of *norna* since high level forms of the latter are typically greyer and more thinly scaled than is normal and spotting is considerably reduced and can sometimes be absent. Despite these superficial similarities the two taxa are easily separable by dissection of the male genitalia, and these characters have confirmed the presence of both species on Grönnasen. Other interesting butterflies from this hill include a single moder-

ately fresh female *Colias nastes* caught at 400 m. (just above the tree-line) on 4.7.71. We spent quite a lot of time in roughly the same place on subsequent days but saw no more, and it seems probable that this specimen was a stray. It is just outside the usual range of the species, and I believe the first record for the area.

We met the Larsens, another Danish family collecting butterflies, on 7.7.71 and enjoyed their company for three or four days. Mrs Larsen caught a specimen of *Clossiana polaris* near the roadside about a mile south of Grönnasen, and after a good deal of searching in less than ideal conditions we eventually caught three more between us in the same place. I also caught a deformed male on Grönnasen but the existence of a colony there could not be established, although it seems unlikely that this individual had the flying power to cross the lightly wooded and marshy valley separating it from the proven colony a mile or so away. The superabundance of *C. chariclea* and deteriorating weather spoiled our chances of assessing the strength of the colonies, since *polaris* is notoriously dependent on good weather for its activity. Although this species has not recently been noted from these parts it seems probable that the high mountain plateau south of Gargia supports several colonies. The biotype in the two areas was very similar; very shallow and predominantly dry south facing valleys with a good variation of moorland plants none of which, however, seemed commoner here than elsewhere nearby. In both places *Dryas octopetala* was virtually absent; none at all for a radius of 70 m. on Grönnasen, and for about 200 m. around the colony to the south I could find only eight plants comprising one small patch. This plant, which is commonly but probably erroneously cited as the most likely foodplant for *C. polaris,* was quite abundant in the general area but repeated searches among it failed to produce the butterfly. Most collectors with field experience of *C. polaris* are unconvinced that *Dryas octopetala* is the foodplant, and *Cassiope tetragona* has been mentioned as a possible alternative by some Scandinavian authorities. The distribution of this plant, as far as it is mapped, seems to correlate reasonably well with that of the butterfly.

Three *Erebia* species were found near Gargia, and we were particularly struck with the high degree of zoning between them. *E. disa* was common around the tree-line on Grönnasen, extending over quite a large area, and small colonies existed elsewhere on high moorland and hilly slopes as well as in its more usual marshy habitats. *E. medusa polaris* Stdgr. was found commonly in a small area at 250-300 m. by the roadside on the way to Grönnasen from Gargia, and the ubiquitous *E. pandrose* filled the gaps. However, we did not see much of the latter in areas where another *Erebia* was flying, and it seemed that good numbers of only one species were to be expected on any particular patch of ground.

The low ground near the Fjellstue at Gargia was varied

and very productive. Open mixed fir and birch woodland with large growths of *Viola* afforded *Clossiana thore borealis* Stdgr., *C. selene, C. euphrosyne* and the odd *Colias palaeno,* while *Rubus chamaemorus* and *Vaccinium uliginosum* bogs were alive with *P. eunomia, C. frigga, B. sifanica, V. optilete* and smaller numbers of *Oe norna, C. euphrosyne* and *C. freija.*

Our departure from Gargia was made a good deal less of a wrench by some rotten weather on our last full day, when the temperature was only 6° C at noon and a strong north wind swirled drizzle around our lingering collecting hopes; but even then it was hard to leave these idyllic surroundings and the excellent hospitality of the Larssons. On our last day we met a Norwegian collector, Herr. Lühr, but the poor weather gave us no chance to collect together, though swapping notes was helpful for the future. As we left Gargia the season was showing the first signs of going over the top, and although everything was still to be found in fresh condition at high levels, some specimens at lower altitudes were becoming a little worn.

We had hoped to be able to compare the state of the season in the two areas when we returned to Abisko on 15.7.71, but unfortunately the weather at Abisko had recently been so poor as to make any comparison futile. There was a little fresh snow persisting above about 800 m., and it had been cold and wet (with some sleet at the Touriststation) for almost a week. The 15th of July was apparently the first warm or sunny day for some time, and we collected around Abisko Öst in the previously explored marshes. We found very little, only *P. napi adalwinda* and *C. palaeno* being in worthwhile condition or numbers, and of the fritillaries even *B. sifanica* was in rags and scarce. It was difficult to say whether the cold spell had actually finished the season or whether it had merely postponed fresh emergences, but in either case it did not seem worth collecting there again on our one remaining day. Instead we revisited the limestone outcrops behind Bjorkliden, and saw a lot more butterflies, many of which seemed to be freshly emerged. In particular *C. hecla* and even *C. nastes* were common and a few *C. palaeno* were caught nearby. *B. napaea* and *B. sifanica* were both plentiful and as soon as we arrived between 10.30 and 11.00 a.m. we caught five fresh specimens of *A. glandon aquilo* in an area of only a few square yards. In spite of concentrating our efforts for this species and continuing good sunshine we saw no more either here or in similar spots nearby; possibly this species is at its most active early in the day.

We saw 29 species of butterfly while we were north of the Arctic Circle, and with both of us working reasonably hard there were times when we were catching useful material faster than we could box it. At one stage we had shade temperatures of around 30°C, and, but for the mosquites we could have done without jerseys for most of the time.

In conclusion I would emphaise again that we were exceptionally fortunate this year, — it is said of collecting in the

Arctic that one has to walk many miles to see butterflies; that large areas seem to be wholly without them; that it is in no way comparable with Southern Europe. That we found it in every-way similar to collecting in Southern Europe should not be taken as typical; it merely underlines our great fortune with the all-important good weather.

Species seen in Arctic Scandanavia:

P. napi adalwinda: Very common and fresh (22.6.71) around Abisko, especially near human habitation, but up to nearly 900m. on Nuolja. Not seen at Gargia, but still in reasonable condition when returned to Abisko on 15.7.71.

C. nastes werdandi: Common around Abisko from 22.6.71; some still fresh at 550m. on 16.7.71. One female taken at Gargia (4.7.71, 400m.) just outside its normal range.

C. hecla sulitelma: First seen in the hills behind Bjorkliden (near Abisko) at 550m. on 27.6.71 by Herr. Schüter and by me three days later; still fresh and very much commoner in the same place on 16.7.71 Common and fresh at Gargia from 4.7.71.

C. palaeno: First seen at Abisko by Herr. Schlüter on 1.7.71. At Gargia, single specimens widely distributed throughout our stay. Past its best but common at Abisko on our return (15.7.71).

A. urticae: One or two battered examples at Abisko on 22.6.71 and larvae at various stages of growth all the time we were there. My bred series is only slightly darker than is usual for English specimens.

B. sifanica: First seen on 29.6.71 at Abisko; common here and at Gargia for the remainder of our stay.

B. napaea frigida: One at 550m. in the hills behind Bjorkliden (near Abisko) on 30.6.71; much commoner and still mostly fresh in the same place on 16.7.71. At Gargia only found in one small area just above the tree-line near Grönnasen.

P. eunomia ossianus: Common and widespread in bogs at low levels; first seen on 26.6.71 and hopelessly worn by 15.7.71.

C. selene hela; Becoming widespread and abundant in open woodland after 1.7.71.

C. euphrosyne fingal: Common at low levels from 22.6.71, becoming worn by about 8.7.71.

C. thore borealis: Only seen at Gargia, where it occurred in several territorially small but abundant colonies among *Viola* in the birch zone, but oddly enough only where *Junipera* was also growing. Both sexes fresh.

C. frigga: First seen at Abisko on 26.6.71, but few and in only one place. Much more widespread both above and below the tree-line at Gargia, among the densest growth of *Rubus chamaemorus* at the edges of bogs, and mostly fresh throughout our stay.

C. improba improbula: Locally common and fresh in several places on Mt. Nuolja at about 900m. (28.6.71).

C. freija: Fully out when we arrived at Abisko (22.6.71) and not uncommon. Still fresh on high ground at Gargia, but

worn at lower levels. Probably not a good year for this species; although we found it singly over a great range of terrain we never found it as commonly as others seem to have done in the past.

C. polaris: One colony (4 specimens in all) south of Gargia at 500m. first noticed by Frau. Larsen, and a single specimen about a mile away on Grönnasen. The only previous record I can find for the area is a single dot on Nordstrom's distribution map apparently very near Alta.

C. chariclea: On Grönnasen and the mountains to the south at 450-550m.; excessively. common and fresh from 4.7.71 Females still active in dull weather, but males much more dependant on sunshine.

E. iduna: Locally abundant in small pockets in the birch zone at Abisko, typically at the edge of marshy areas. First seen on 26.6.71 when it was universally fresh, but becomming hopelessly worn and much scarcer by 1.7.71. Evidently a species of extremely brief duration, and it is easy to understand why it is so often missed.

Oe. norna: Very scarce round Abisko from 26.6.71, but quite well spread at Gargia above and below the tree-line, generally near moisture. Rather variable; some specimens from high altitudes have reduced spotting and are greyer.

Oe. bore: At high levels on Grönnasen, above *Oe. norna*. Not very common, and exasperatingly alert and agile on the wing. Fresh from 4.7.71 until our departure. The identification of this species has been checked by dissection.

E. ligea dovrensis: Only seen at Narvik on 15.7.71 when it was common and fresh in poor weather.

E. disa: Very abundant and fresh at Stordalen (near Abisko) on 23.6.71. Also found commonly around the tree-line on and near Grönnasen at Gargia from 4.7.71 onwards.

E. medusa polaris: A locally abundant colony found by the road from Gargia to Grönnasen. Fresh from 5.7.71 onwards.

E. pandrose: Commonest on dry ground at all levels, fresh at first but in varying stages of decay by the time we left.

C. rubi borealis: One worn female taken by Herr. Schlüter at Abisko on 29.6.71.

V. optilete cyparissus: Common and widespread among *Vaccinium uliginosum*, but not seen before 26.6.71.

A. glandon aquilo: One taken by Herr, Schlüter on 30.6.71 at 550m. behind Bjorkliden (near Abisko), and five more fresh specimens caught at the same place on 16.7.71.

P. icarus: One fresh female taken by Anna Schlüter at Abisko on 29.6.71.

P. andromedae: Common at 550m. in the hills behind Bjorkliden (near Abisko) on 29.6.71, and still reasonably fresh on 16.7.71.

P. centaureae: One fresh female at Abisko on 1.7.71.

References

Schlüter, *Atalanta*, 1968, **2**, 74.

de Worms, C. G. M. *Entomologist*, 1951, **84**, 121.

Johnson, G. *Entomologist's Record*, 1960, **72**, 203.

Johnson, G. *Entomologist's Record*, 1964, **76**, 259.

Gross, F. J. "Zur Systematik und Verbreitung der Arten der Gattung *Oeneis* Hb." *Mitteilungen der Münchner Entomologischen Gesellschafte*, 1968, **58**, 1.

Nordstrom, F. "De Fennoscandiska Dagfjärilarnas Utbredning" Vol. 1, Lund University 1955.

Hultén, E. "Atlas över Växternas Utberdning i Norden" Stockholm, 1950.

44 Lovelace Avenue, Solihull, Warwicks.

A Sample of the Lepidoptera of the British Virgin Islands

By J. A. C. Greenwood, O.B.E., F.R.E.S. and Mrs D. F. Greenwood

Mr and Mrs Percy Chubb of New York most kindly invited us to visit their holiday home on Peter Island from 30th January to 5th February, 1971. The island is $4\frac{1}{2}$ miles from Tortola, the capital of the territory, and is shaped rather like a boomerang. Their estate forms the western one quarter of the island and their 273 acres includes the highest point 387 feet above sea level.

The island is hilly and densely wooded so that, except for a relatively small cultivated area near the house and jetty and a path cut across the saddle back, it is difficult to move except in the area of the beaches. Other parts of the island can only be reached by boat.

The British and U.S. Virgin Islands are intermingled and consist of a large number, the exact total depending on the enumerator's definition of an island, varying in size from little more than a large rock up to many square miles in area. From almost any point at least a dozen other islands can be seen. They are thought to be the surviving tops of mountain ranges which have been almost submerged and heavily abrased. Titled strata are apparent and there are numerous coral reefs.

Just south and very close to Peter Island is Norman's Island which is supposed to be the setting used by R. L. Stevenson for "Treasure Island". Just to the north is Dead Chest Island which is alleged to be the "Dead Man's Chest" of the song. It has no harbour and no fresh water.

The weather during our stay was superb, with day temperatures in the eighties Fahrenheit and nights only a few degrees cooler. Occasional showers kept the vegetation fresh, and frangipanni, hibiscus and oleander flourish.