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THE PROPOSED MAGELLANIC TYPE-LOCALITY OF *COLIAS IMPERIALIS* BUTLER (LEPIDOPTERA: PIERIDAE)

SUPUESTA LOCALIDAD TIPO DE *COLIAS IMPERALIS* BUTLER (LEPIDOPTERA: PIERIDAE)

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ABSTRACT

The true type-locality of *Colias imperialis* Butler and its senior synonym *C. ponteni* Wall. remains unknown. Butler supposed it came from Port Famine, based on the type-series being housed in the British Museum with material collected there by the *Adventure* expedition. Wallengrén gave the type-locality of *C. ponteni* as Honolulu, Hawaii, which is very improbable, but the *Eugenie* expedition had also stopped briefly at Port Famine and G. Lamas inferred that the types were probably collected by that ship's naturalists on an expedition to Cerro Tarn. However, neither the vegetation nor the climatology, nor the published narratives of both expeditions, supports these inferences. If this is truly a Magellanic insect it probably was taken in steppe habitat farther north, perhaps at the classical "Cabo Negro" locality or near Punta Delgada. The species is so important for phylogeny reconstruction that every effort should be made to rediscover it.

KEY WORDS: Biogeography, Fuegian-Magellanic region, Lepidoptera, *Colias*

RESUMEN

La verdadera localidad-tipo de la mariposa *Colias imperialis* Butler (=*C. ponteni* Wall.) permanece desconocida. La vegetación, la climatología y los relatos de las expediciones *Adventure* y *Eugenie* no apoyan las conjeturas de Butler (Puerto de Hambre, Magallanes) y Wallengrén (Honolulu, Hawaii) sobre la localidad-tipo. Tampoco son consecuentes con la inferencia de G. Lamas (Cerro Tarn). Si este insecto es realmente de origen magallánico, probablemente fue colectado en ambiente estepario cerca de Cabo Negro y/o en la zona de Punta Delgada. La especie es muy importante para la reconstrucción filogenética por lo que es necesario hacer esfuerzos para volver a encontrarla.

KEY WORDS: Biogeografía, Región Fueguina-Magallánica, Lepidoptera, *Colias*

INTRODUCTION

The provenance of the "lost" butterfly, *Colias ponteni* Wallengrén = *C. imperialis* Butler remains unknown as the species was never collected again, and both published "type localities" are doubtful. Both names are still encountered in the literature, and the history of their "type localities" requires that both be kept in mind in any discussion of the species. Because this is the morphologically most primitive *Colias* in the world (Peterson, 1963) its true locality is of great biogeographic and evolutionary interest. The genus *Colias* is largely holarctic, with one species

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in subsaharan Africa and a group of species in the Andean region, from Colombia to Tierra del Fuego. The greatest diversity of species and species-groups is in the interior of Asia. The alleged type localities of *C. ponteni* and *C. imperialis* are "Honolulu" (Hawaii) and "Port Famine" (Magallanes), respectively. Both seem intrinsically improbable on biogeographic grounds, but how reliable are they historically?

Gerardo Lamas M., in a letter to the author (cited by Shapiro, 1991, pp. 179-180), opined that the most probable locality was Cerro Tarn, just south of Port Famine (Puerto del Hambre). He did not explain the basis for this inference, which I repeated uncritically. Since then I have been able to review the surprisingly copious documentation relevant to such a claim. This includes the published accounts of the expeditions of the British ship *Adventure*, which might have supplied Butler's material, and the Swedish frigate *Eugenie*, which apparently supplied Wallengrén's. Absent a rediscovery of the insect, these antique records offer our best hope of identifying whence came the original collections.

Taxonomic History

Colias ponteni was described by Wallengrén in the *Wiener Entomologische Monatsschrift* for February 1860 (p. 33). The type-locality information reads (in Latin): "Ad Honolulu in Ins. Oahu mensibus Junii et Julii D.D. Kinberg et Pontén speciem hanc elegantissimam colligerunt." (Drs. Kinberg and Pontén collected this very elegant species at Honolulu on the island of Oahu in the months of June and July.) This and other material described in the paper was apparently received directly from Pontén.

Wallace (1867), in a review and catalogue, repeated the description and listed the "habitat" as "Honolulu, Sandwich Islands."

Colias imperialis was described by Butler in the *Proceedings of the Zoological Society of London* for 1871 (p. 250) with type locality "Port Famine (King) --Three examples, B.M.-- From the supplementary cases of the Banksian cabinet, in company with a collection from Port Famine, presented by Capt. King." Thus the Magellanic region enters the story; note that Butler was not certain whether these specimens actually formed part of the King Port Famine material.

Butler did not recognize that his *C. imperialis was* the same species as *C. ponteni.* In 1874 he catalogued the latter from the "Sandwich Islands" (*Wallengrén*)(Butler 1874, p. 287).

To evaluate the alleged type localities, we must examine the records of the *Eugenie* expedition, which supplied the material seen by Wallengrén, and the *Adventure* expedition, whose Captain (King) may have presented the types of *C. imperialis* to the British Museum.

The *Eugenie* Expedition

The 36-gun frigate *Eugenie* was sent around the world to "show the Flag" by Sweden's King Oscar I in 1851. It carried scientific as well as military and diplomatic personnel. In the course of its voyage it called at *both* Port Famine and Honolulu. The definitive account of the voyage was written by First Lieutenant C. Skogman, the ship's astronomer, and published in two volumes in Stockholm, 1854-55. It has been translated into various languages. Another narrative of the voyage was published by Nils J. Andersson, a botanist from the University of Uppsala, who accompanied the expedition. It appeared in Swedish in 1853 and in German (translated by K.L. Kannegiesser) in 1854.

The *Eugenie* in Port Famine. -- The entire South American portion of Skogman's book was translated into Spanish by K. Henrichsen and published (Skogman, 1942). The following English translation is made from it (p. 167): "During the three days that we remained in Port Famine [31.I-2.II.1852], the weather behaved well enough, within the scope of what one might expect in these regions. The sky was almost always overcast and the mountain peaks enveloped in clouds, but the rain was insignificant and no appreciable wind blew. We got a glimpse of Mount Sarmiento only twice.... the maximum temperature of the air was 14ºC and the minimum 5º C..." These are hardly favorable meteorological conditions for butterfly collecting, but they are typical of the locality, even in summer: low stratocumulus clouds with only infrequent breaks are very common, obscuring the peaks exactly as described by Skogman, and in such conditions butterfly collecting is impossible. The clouds typically thin rapidly to the north and northeast over the

magellanic steppe, where the sun may shine brightly even as Port Famine sits in gloom.

The ship's naturalists mounted a quick expedition to Cerro Tarn, and because this was the only such effort recorded by Skogman, Lamas presumably focused on it as the probable source of the specimens later described by Wallengrén. Of this expedition, Skogman writes (p. 161): "Dr. Kinberg and Prof. Andersson made an excursion toward Mt. Tarn, of 3000 feet [=819m, Instituto Geográfico Militar, 1970] but did not reach the summit. In return, they came back with notable collections of the local flora and fauna .... there are meadows, extensive although low, which could supply fodder to a substantial number of livestock.... the stream narrows and is not very deep and moreover is crossed by a number of fallen trees... The margins are picturesque enough...beech trees whose branches unite above the stream and whose trunks are loaded down with exuberant creepers of the most varied sorts...the soil is boggy and covered with an innumerable legion of rotten trunks and thick caps of moss."

Andersson (in German translation, 1854) devotes four pages to descriptive natural history of Patagonia and the Fuegian-Magellanic region, which he refers to collectively as "Feuerland" (pp. 63-66). He describes the visit to Mt. Tarn, fully corroborating Skogman's narrative and stressing the gloom and dankness of the place, and never mentioning any entomological collections. Oddly, Moore (1983) misses the *Eugenie* altogether in his history of botanical collecting in the region.

The *Eugenie* in Honolulu. -- The principal narrative of the *Eugenie* in Honolulu, 22.VI-2.VII.1852, was extracted from Skogman (1854, pp. 182-199) and published in English translation by Dutton (Skogman, 1853). It is a detailed account of the geography and setting of Honolulu, the American settlement, and a superficial portrait of native Hawaiian culture. The corresponding section of Andersson (1854, pp. 200-202) is very similar. Again, there is no reference to entomological collections. Wallengrén described no other Hawaiian insects in his paper, but in one case he did question whether the type locality was accurate. He seems to have had no such doubts regarding *C. ponteni*.

The *Adventure* Expedition

H.M.S. *Adventure* was a forerunner to Darwin's *Beagle*. Under Captain Philip Parker King, it was in the vicinity of the Straits of Magellan for an extended period; entomological collections were made during the austral summer of 1826-27. An attempt was made to catalogue these collections, with descriptions of new species, but it was aborted before the Lepidoptera were reached; it consisted of a general introduction by J. Curtis, published along with the Hymenoptera by A.H. Haliday and the Diptera by F. Walker (Curtis *et al.*, 1837) and the Coleoptera in two parts, by Curtis (1841, 1845). Captain King provided a detailed account of the voyage (King, 1839); the ship's naturalist was J. Anderson. King gives the first account of Mt. Tarn, which his party named for the *Adventure's* surgeon, Mr. Tarn:

> (9 February) Our way led through thick underwood, and then, with a gradual ascent, among fallen trees, covered with so thick a coating of moss that at every step we sunk up to our knees ...

At about 1300 feet they got to tree line:

> We next traversed an extent of tableland, much intersected by ponds of water.... We then ascended 3 or 400 feet, and crossed a deep ravine. The bottom of the ravine was clayslate in a decomposing state, but the surface of the ground was strewed with pebbles of granite. Another plain, with many ponds, succeeded...studded here and there with small clusters of dwarf beech [the typical tree-line of *Nothofagus antarctica* in *krumholz* habit -- A.M.S.] (King,1839, pp. 39-44)

Temperatures at the 1300-foot level were measured as 46.5-47.5ºF, and at the summit 40-43ºF, with "many squalls of sleet and rain." The overall character of the regional vegetation was summarized thus: "Excepting near the sea, where clay-slate showed itself, the side of the hill is clothed in trees and underwood."

Various groups of animals are catalogued from the region, but among invertebrates only the Mollusca. No Lepidoptera are mentioned in the entire narrative except "two or three" collected on

the Patagonian mainland in late November or early December 1826.

Philip R. Ackery, Collection Manager - Butterflies at the Natural History Museum, London, advises me (*in litt.*, 27.I.1992) that there is no further information beyond the label data for the type-series of *C. imperialis*, viz.: "From the Banksian Collection/Port Famine (King) Coll. Banks," which as we have seen is a more confident attribution than Butler's published one.

Charles Darwin On Mount Tarn

Darwin called twice in the Port Famine area on the voyage of the *Beagle*. In January 1834 he remained mostly in steppe, but he ascended Mt. Tarn in February and wrote an account of the experience which very closely matches the others (Darwin, 1839, p. 265):

> So gloomy, cold and wet was every part, that not even the fungi, mosses or ferns could flourish [above tree-line]. In the valleys it was scarcely possible to crawl along, they were so completely barricaded by the great mouldering trunks..."

Needless to say, there is no mention of butterflies. Had there been any, they surely would have excited Darwin due to their incongruity in such a setting.

In June 1834 Darwin returned to Port Famine in winter, and was blessed with exceptionally good weather - but due to the season, we can assume no Lepidoptera were flying.

Discussion

Mount Tarn is humid to perhumid and heavily forested today as then, except at the rocky summit where low cushion plants occur. Pisano (1977) published a phytogeographic map of the Port Famine area. The "meadows" mentioned by Skogman are inundated or marshy (mapped as "vegas y praderas higrofíticas;" the term "vega" always refers to wet meadows).

There is no forest *Colias* known in South America. Indeed, *Colias occidentalis* Scudder, from the Pacific coast of North America, may be the only true forest *Colias* known. *Colias vauthierii* Guérin of Patagonia occurs on *vegas* farther north, especially near the northern extreme of its range in the Argentine provinces of Neuquén and Mendoza (Shapiro, 1991). It seems to be absent from truly wet meadows in the far south. Given that the *Nothofagus* forest around and on Mt. Tarn has much the character of boreal muskeg -- and has no native Legumes as prospective hosts (Moore 1983) -- the inference that *C. imperialis* was collected on the Mt. Tarn excursion seems very unlikely. If it was, it was almost certainly taken on the "meadows" (llanuras) and not on the mountain.

There is in fact nowhere close to Port Famine which seems likely as a collection site, although any of the magellanic steppe to the north and east would be plausible on both climatological and botanical grounds (at least three prospective Leguminous hosts occur there; Moore 1983). Thus it is of special interest that Herrera and Pérez (1989) recently discredited another Butler "Port Famine" type locality and shifted their focus northward toward the magellanic steppe. What can this case teach us?

The species in question is *Stuardosatyrus williamsianus* (Butler), originally described in the genus *Argyrophorus* (Satyridae), with type locality "Port Famine." This specimen was not from the Banksian cabinet or the alleged King material. Rather, it was collected by Darwin himself or his assistant. The story of Darwin's insects has been meticulously documented by Smith (1987). The specimen of *S. williamsianus* was one of a lot of 9 Lepidoptera from "Port Famine" presented to the British Museum by Darwin in 1846. Doubleday (1848) recorded three Darwin butterflies from "Port Famine." Vane-Wright located another (Smith 1987, p. 79). In his own notes, Darwin refers to this material *not* as from "Port Famine" but "Cape Negro." Cape Negro (Cabo Negro) was a frequent collecting locality and is shown on the map in Smith (1987, fig. 4, p.17). It is within the magellanic steppe, indeed nearly at its southernmost extent.

Herrera and Pérez cover some of the same history as this paper, citing also a description of Port Famine from the French *Astrolabe* expedition. They also conclude that their species of interest, *S. williamsianus*, would be very unlikely in the perhumid forest habitats around Port Famine. Unlike *Colias imperialis*, *S. williamsianus* re-

mained well-known in Argentine territory, only "disappearing" from Chile. Having rediscovered it recently at Punta Delgada - Primera Angostura in steppe, Herrera and Pérez infer that Darwin probably found it there too, using the label "Port Famine" in a collective sense for various localities on the Magellan Strait. This inference is supported by the evidence in Smith (1987), which they do not cite. (It is also not cited in Pérez, 1991, but agrees broadly with that paper.) All of the butterflies cited in Smith (*loc. cit.*) from "Port Famine" occur in steppe, but only *Tatochila theodice gymnodice* Stgr. (Pieridae) and *Yramea cytheris* Drury (Nymphalidae) occur in wooded habitats at all, and are less common there than in steppe.

Conclusions

Colias ponteni=C. imperialis may well be of Magellanic origin, but neither Port Famine nor Cerro Tarn is a likely source for it. Port Famine was visited by nearly all 19th-Century expeditions to the region because of its sheltered location, and may have served often as a generic locality or geographic reference for material collected on forays away from the harbor - even ranging north and east into steppe. At least that seems more plausible than the existence of a *Colias* in perhumid forest.

There is no *Colias* recorded from Hawaii (Zimmerman 1958, Riotte and Uchida 1979) or anywhere else in Oceania, making "Honolulu" an extremely improbable venue. (The aberrant morphology would be consistent with an oceanic island species, were it not seemingly unambiguously *primitive*. The alternative scenario, that it represents a reversion in genital morphology, is conceivable although unparsimonious. At any rate, the *Adventure* did not collect in Hawaii. However, the occurrence of the type-series of *C. imperialis* in the same drawer as the King material could have been fortuitous - the butterflies might not have been from the *Adventure* at all.)

The geographic commonality between the two expeditions is the Strait of Magellan. Even if Port Famine is an unlikely locality, it would seem that the best strategy for seeking the lost Magellanic *Colias* would be to collect in steppe north of Port Famine in January or February.

Acknowledgments

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