in shoals. About the month of March they go up to spawn. I have fished at the mouth of the same river at all seasons in the salt water and caught lots of so-called herrings, which are, I believe, a kind of mullet, but never caught a single grayling at any time. They remain about a month, and then not one to be seen higher or lower."

Notwithstanding this negative evidence obtained from Mr. Norgrove, I am still inclined to think that the grayling does resort to the sea. When I consider the small size and nature of the Maitai river, I cannot otherwise account for their disappearance during a portion of the year. From its source in Landtrap Gully to its mouth is a straight line for from seven to eight miles, running over a rocky floor the greater portion of that distance. How could immense numbers of fish such as were formerly found conceal themselves, and again, where are the small fish? No one seems ever to have seen grayling less than six inches in length, nor have the large fish been seen except in shoals.

From a still smaller stream, the Waitohi, in Picton, where grayling have been taken, I endeavoured to procure information, but could not get such as I could rely on. It is impossible to observe their habits in the large rivers, such as the Wairau, Pelorus, or Waimea, owing to their rising amongst inaccessible mountains, but wherever they have been seen it has been in shoals always making up stream.

The sea-mullet ascends the Pelorus river during very warm weather, five or six miles above the tide-way. On one occasion in the autumn in a net set for them I caught some grayling which seemed to have been swimming along with the mullet. In this river they do not enter any of the small back streams but confine themselves to the Rai Valley branch and the main stream. This may be owing to the river being surrounded with bush from its mouth to its source. They can therefore find shelter wherever they go.

Such is the information I am able to furnish. It leaves the question, Is the grayling a fresh-water fish? unanswered, but it may assist in throwing some light on their habits.

Art. XXXIII.—*Supplementary Description of Species or Varieties of* Chrysophani (Lepidoptera rhopalocera) *inhabiting New Zealand.*

By R. W. Fereday, C.M.E.S.L.

Plate VIII.

[*Read before the Philosophical Institute of Canterbury, 2nd August,* 1877.]

In the last volume of our "Transactions"* will be found some "Brief observations on the genus *Chrysophanus*, as represented in New Zealand,"

* "Trans. N.Z. Inst.," IX, 460.

indicating certain characters and circumstances which appeared to afford reasonable ground for treating several of the New Zealand forms of *Chrysophani* as distinct species or varieties.

Not having had time to complete the coloured drawings intended to illustrate the several forms, I promised to prepare such drawings and to give a full description in a future paper, and I now fulfil that promise.

The several letters—A, B, C, D, E, F and G—used in my former paper to indicate the different forms, will be now used to indicate the like.

Chrysophanus salustius, *Fab.*

B. *Male: Primaries.*—Broad; costa slightly rounded towards the apex and considerably so at the base; hind margin uniformly convex.

Upper side.—Fulgid golden-copper, dusky at the base; the dusky shade not extending to the discoidal dots; two black dots before the middle, the one being in the discoidal cell and the other between the medial and anal nervures; a black quadrate patch on the false nervure closing the discoidal cell; beyond the middle and midway between the quadrate patch and the submarginal band, a curved and rather narrow black band disrupted by the intersection of the nervures; a submarginal black macular band, the maculæ more or less confluent; hind margin bordered with black; the border and submarginal band contiguous towards the anal angle, and confluent towards the apex where they expand and form a broad termination on the costa; nervures slightly bordered and in some individuals slightly irrorated with black; cilia pale fulvous.

Under side.—Luteous; the base, costa, hind margin, and apex, pale dull yellow blending with the luteous; the discoidal black dots and quadrate patch as on the upper side, the latter formed of two confluent spots, the first band beyond the patch represented by seven (occasionally eight) roundish black spots, and the spot between the externo-medial and subexterno-medial nervures being (in some individuals) blotched outwardly, and the two between the subexterno-medial and anal nervures being didymous; the maculæ of the submarginal band diminish in size from the anal angle towards the apex where they become obsolete; cilia pinkish-orange.

Secondaries: Upper side.—Fulgid golden-copper, dusky at the base and inner margin; a dusky dot in the discoidal cell towards the base; a black patch closing the discoidal cell, midway between which and the submarginal band is a rather narrow irregular curved black macular band; the maculæ of the latter band sagittate; hind margin bordered with black, the black border and submarginal band being confluent towards the anterior margin; cilia pale fulvous.

Under side.—Saffron or cadmium-yellow; the maculæ of the upper side being repeated, but very obscure; cilia pinkish-orange.

A. *Female.*—Similar to the male, except that on the upper side of the wings the nervures are more irrorated with black, the basal shade extending to the discoidal dots, the dark bands broader (the sub-marginal bands especially so), and the maculæ thereof more united, the maculæ of the sub-marginal band having pale-violet lunular pupils very distinct on the secondary and less so on the primary wing, the lunules becoming obsolete as they approach the costa of the primary wing. In some individuals the violet lunules are more or less obsolete or entirely absent.

The figures B and A respectively represent the upper side of the male and the upper side of the female—B representing the body and right wings of the male, and A the left wings of the female. Figure 2 represents the under side.

Expanse of wings—1 inch 2 lines.

Hab. New Zealand.

Time of appearance: December to March.

Frequents grassy places, particularly sunny banks; seems to be distributed over most parts of the South Island, for I have met with it in all localities I have visited. I cannot say with certainty if it is found in the North Island. Mr. Butler, of the British Museum, informs me that the female was described by Fabricius as *salustius*, and by Doubleday as *edna*, and consequently the Fabrician name *salustius*, being the earlier, will take precedence. Neither Fabricius nor Doubleday mention the violet pupils of the maculæ of the sub-marginal band; but possibly the pupils were absent in the specimens they described, for some individuals in my possession have the pupils nearly obsolete.

There is an error in the printing of my former paper,* which materially lessens the force of the passage. The word *copulâ* should be in the place of "company."

C. MAUI, *Fereday.*

C. *Male.*—I can add but little to what I have written in my former paper as to the distinctive characters of this form, but that the secondary wings are more produced and angular at the anal angle than in any of the other forms, with the exception perhaps of form E (male), the secondaries of which have nearly the same angle; the maculæ of the sub-marginal band are more separated than in the other forms, the two between the sub-externo-medial and subinterno-medial nervures of the primaries and the three nearest the anal angle of the secondary wings being very conspicuous and somewhat rounded, the others being more or less obsolete in different

* *Loc. cit*, 461, line 20.

individuals. In some individuals the maculæ of the band beyond the middle on the upper side of the primary wings are obsolete, the under side of the wings of some examples is nearly similar in colour to the under side of the wings of *C. salustius*, but in general the yellow is more sordid and the markings of the secondaries more distinct (as shown on Pl. VIII, fig. 1).

Fig. C. represents the upper side of the male and fig. 1 the under side The female I have not yet seen, the few specimens taken by me having been all males.

Exp.—1 inch 3 lines.

Hab. Wellington and Hawke Bay.

Time of appearance: February (and probably in spring).

Taken flying in open clearing in bush.

C. FEREDAYI, *Bates.*

D. *Male and Female.*—Mr. Bates' description,* and the observations in my previous paper, sufficiently indicate the distinctive characters of this form. Fig. D. represents the upper side of the male and fig. 3 the under-side.

Exp.—1 inch 3 lines.

Hab. Mount Torlesse Station and Kaiapoi, Canterbury.

Time of appearance: December to March.

C. RAUPARAHA, *n. sp.*

E. *Male.*—The following may be added to the description contained in my former paper:—

Primaries.—Narrower than in any of the other forms; costa very slightly concave beyond the middle, rounded towards the tip and abruptly so at the base. Hind margin much more oblique than in any of the other forms, and slightly concave near the anal angle.

Upper side.—Fulgid copper, but not so bright and glistening as *C. salustius* or *C. maui;* dusky at the base; the discoidal dots, quadrate patch, and bands black; bands narrow and maculæ small, but not so much so as in *C. maui;* the sub-marginal band very broad towards the costa, and, conjoined with the border of the hind margin forms a broad dark tip; nervures black, and more narrow than in the other forms; cilia dark fulvous.

Under side.—Disc luteous, the base and along the costa fuscous, and also a fuscous border on the hind margin; very broad at the apex, and narrow towards the anal angle; the discoidal dots, quadrate patch, and sub-marginal band represented as in the other forms, but the maculæ less rounded; cilia pinkish-brown.

* "Ent. Mo. Mag.," IV., 53.

Secondaries.—Anal angle rectangular.

Upper side.—Same colour as upper side of primaries; dark markings, similar to those of form B., but less distinct, and the dark border and sub-marginal band not confluent towards the anterior margin; cilia dark fulvous.

Under side.—Fuscous; the markings of the upper side repeated, but very indistinct; each macula of the sub-marginal band bears a pale lunule, and has also a pale outward margin; cilia pinkish-brown.

Fig. E. represents the upper side of the male and fig. 4 the under side.

Exp.—1 inch 3·5 lines.

Hab. Kaiapoi Bush, Canterbury.

Time of appearance: December and January.

I discovered this form at Kaiapoi Bush, where it was not uncommon before the bush was destroyed. I know of no other locality where it has been seen or taken.

(?) C. RAUPARAHA.

F. *Female.*—This, as stated in my former paper, I believe to be the female of form E.

Exp.—1 inch 4 lines.

Hab. One specimen taken at Kaiapoi Bush and one at Fendalltown, near Christchurch.

Time of appearance: January.

C. BOLDENARUM, *White.*

G.—I have two or three varieties, and am not quite clear as to which Mr. Butler's description, in his "Catalogue of *Lepidoptera* of New Zealand," p. 3, refers. The figures 8 and 9 in plate at the end of his catalogue most nearly agree with the variety found (or formerly found, for I have not seen it for some years past) within the city of Christchurch, on some flat sandy waste ground. Mr. Butler, referring to the figures, states, "the bands and spots on the under-surface of secondaries have been made altogether too dark," which is not the case with the Christchurch specimens, the latter being generally darker than shown in Mr. Butler's figure, though some individuals are not quite so dark.

The varieties appear to be due to locality, as the individuals of each locality vary but little.

There are three localities where I have taken this insect, namely, Christchurch; Drayton Station, on the plains near Mount Hutt; spurs of mountains near Castle Hill Station; and the top of the Mount Hutt range—all in the Canterbury province.

The distinctive characters of the varieties may be better understood by the following tabular arrangement.

R.W.Fereday, del. *To illustrate paper by R.W.Fereday.* J.B. lith.

CHRISTCHURCH.	DRAYTON STATION.	MOUNT HUTT AND SPURS OF MOUNTAINS NEAR CASTLE HILL STATION.
MALE.		
Primaries.		
Upper side: Dark dusky brown mingled with fulvous; disc shot with glistening purple	Same as Christchurch form	Reddish-fulvous, irrorated with dark dusky brown. Otherwise same as Christchurch form.
Costa and base of principal nervures irrorated with golden yellow	Same as Christchurch form	
A more or less indistinct sub-marginal band of black ill-defined spots, upon the inner side of which are bright spots of violet; in some specimens a few small dots of violet represent a marginal series ..	Do.	Marginal series of violet dots distinct, otherwise same as Christchurch form.
A more or less indistinct curved discal band of black ill-defined spots, followed in some specimens by fulvous dashes	Do.	Curved discal band very distinct, the spots rather arched, otherwise same as Christchurch form.
Cilia, brownish dirty grey	Do.	Same as Christchurch form.
Under side: Tawny; sub-marginal band of blackish spots bordered externally and internally with white	The tawny colour paler and more dirty; the spots of the sub-marginal band dark grey, with a patch of white on each spot	Pale ochreish-yellow, in other respects same as Drayton form.
Secondaries. *Upper side:* Dark bronzy brown; markings not visible..	Dark bronzy brown; a dot in the discoidal cell and a patch closing the cell; a curved discal and a sub-marginal macular band and a dark marginal border; the bands and border dusky black, and in the intervening spaces are indistinct fulvous spots, those between the marginal border and the sub-marginal band being reniform; all the markings more or less indistinct in different individuals	Reddish-fulvous; the basal portion of the disc shot with purple; the dot and patch in discoidal cell same as the Drayton form; the maculæ of the discal band arched; the maculæ of the sub-marginal band wedge-shaped and with small violet pupils; all the markings distinct and well defined.

Christchurch.	Drayton Station.	Mount Hutt and spurs of mountains near Castle Hill Station.
Male.		
Under side: Ground colour varying from grey to brown; a broad and very irregular transverse central shade of deep rich brown, approaching to black in some specimens, and edged with white; a sub-marginal band of black roundish spots, each spot margined externally with white and inwardly with a white supercilium immediately followed by a brown one; several sub-basal discoidal spots of dark brown or black edged with white upon a brown ground; all the markings very distinct	Markings pale, and varying from a silvery to an ochreish-grey tint	Pale grey markings very indistinct.
Female.		
Primaries.		
Upper side: Dusky fulvous; not shot with purple; markings similar to those of the male; the violet spots obsolete or nearly so	Rich bronzy brown; the violet spots very bright and distinct; cilia much whiter grey than in the Christchurch form, and distinctly chequered with dark ..	Pale fulvous; in other respects similar to the Drayton form.
Under side: Paler, and sub-marginal spots more obscure than in the male, otherwise similar..	Similar to male	Similar to male.
Secondaries.		
Upper side: Same colour as primaries; markings similar to those of secondaries of male of Mount Hutt form, only more obscure and without the violet pupils	Same colour as primaries; markings similar to the Christchurch form, only less obscure	Same colour as primaries; markings similar to those of secondaries of the Mount Hutt form.
Under side: Markings more or less obscure and general colour browner than that of the male, otherwise similar	Similar to male of Christchurch form, only that the central shade is narrower; markings very bright	Similar to male.
Exp.: Male, 10‴ to 11½‴; Female, 10‴ to 10½‴	Exp.: Male, 9½‴ to 11‴; Female, 10½‴	Exp.: Male, 9‴ to 11‴; Female, 9½‴ to 11½‴.
Time of capture: December*	Time of capture: January and February*	Time of capture: Jan. and Feb.*

Fig. H represents the upper side of the female of the Drayton form.
„ 5 „ the upper side of the male.
„ I „ the upper side of the female of the Mount Hutt form.
„ 6 „ the upper side of the male.
„ 7 „ the under side of same.
„ 8 „ the under side of the male of the Christchurch form.

* The times of capture given here are when the specimens were taken, being the only times I visited the localities.

If the Mount Hutt or the Castle Hill form is a distinct species, as it possibly may be proved to be, I propose for it the name of *Tama*, after a traditionary Maori chief of that name; and should it be held to be a variety only, the name will serve to distinguish it as the mountain form.

The individuals of the Mount Hutt and Castle Hill form were taken in places where *Donatia novæ-zealandiæ* grows, and seeing them hovering about and settling upon patches of that plant in a manner indicating the deposit of their eggs, I carefully searched the plants, and succeeded in finding one larva, of which I made a coloured drawing and wrote out a description. The description has unfortunately been mislaid, but the drawing, a copy of which accompanies this paper, I have preserved. From the drawing and from recollection, I give the following description of the larva :—

Onisciform; pubescent; pale green; dorsal line consisting of a dark purplish-brown conical spot on the fourth and following segments, the apex of each cone pointing towards the head and joining the base of the preceding one at the joint of the segment, the cones margined with white; outside and round the white is a margin of dull red; on the side a row of pale pinkish oblique stripes, blended on the lower side with dull red; the red extending thence to below the spiracles, except on the posterior side of each segment, where a green colour intervenes and is blended with the red; the angles formed by the oblique stripes are shaded with a dark colour. On the second segment is a dorsal diamond-shaped dark purplish-brown spot, with a longitudinal streak of white in its centre. I kept the larva for some time, and fed it upon *Donatia*, hoping to obtain from it a pupa and imago, but, after being apparently full-fed and retreating to the root of the food-plant, it died, without assuming the pupa state. One egg, which I also found at the same time, did not produce a larva.

Fig. *a* represents the larva magnified; *b*, head front segments, also magnified; and *c*, the natural size.

The larva is so characteristic of the genus that there can be little doubt it would have produced a specimen of the Castle Hill form, had it lived and passed through its changes to maturity. I know of no other insect to which it could belong; but there is not sufficient evidence to determine the fact.