ESPECIALLY FOR FIELD COLLECTORS

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THE BREEDING OF THE THECLINI AND COLLECTING THEIR EGGS IN WINTER

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INTRODUCTION

The Theclini is a tribe of the Lycænidæ whose range extends over Korea, Japan and Amurland; the main habitat, so-called the headquarters, lies between the Himalayas and West China. A few species belonging to this tribe are also found in Europe and America.

This tribe, the Theclini, is thought to be closely akin to the Arhopalini and the Strymonini, and comprises approximately 90 species. In Japan, 23 species have so far been known, forming the most remarkable group among the Japanese butterflies. Brilliant and varied in color, these theclinids are much to the taste of many Japanese lepidopterists.

The taxonomical revision of these theclinids had already been made by SIBATANI and ITO by 1946, but, as far as the life-history is concerned, very little had been known until recently.

DEVELOPMENT OF THE STUDIES IN THE LIFE-HISTORY OF THE THECLINI

Before 1945, there had been reared only a few, more or less common species such as *taxila, lutea, sæpestriata, pryeri, attila, orientalis* and *ultramarinus*. Yet the breeding was not begun with eggs, but with caterpillars collected on their foodplants.

As regards the hibernating stage, C. TERANISHI reported in 1936 that *sæpestriata* winters as eggs. He found its eggs in late fall from the twigs of *Quercus acutissima,* the leaves of which had already fallen off. Then in 1937 T. NIIMURA reported the ovipositing habit of *J. lutea.* Consequently, it became possible to deduce the life-cycle of the Theclini from these facts. Now that the problem of hibernation had been solved, it was easy to conclude that they would be in the larval and pupal stages from April to June, or to the middle of July; everybody knows that the Theclinids are on the wing in early summer, once a year.

The study of the life history of Japanese butterflies has been pursued very enthusiastically since the end of war. Thanks to K. HAYASHI, breeding has become so popular that in a few years the life-history of almost all Japan-

ese Hairstreaks came to be universally known to the lepidopterists. He was convinced, by experience, that the eggs of other Theclinids could be found alike, if the collectors living in the neighborhood of the haunts would earnestly search for the eggs laid near the winter buds of supposed foodplants. By observing or collecting the female butterflies in the field, the possibility of finding the eggs on those trees was very great.

This method advocated by K. HAYASHI of collecting the eggs in winter was immediately applied, and brought forth many discoveries. Of the collectors, high school students near the haunts were most diligent egg-hunters. They could collect many kinds of eggs, including those that had been unknown before. The latter ones were reared up to the perfect insects. In this way the eggs, larvæ, pupæ and also new haunts of almost all Theclinids came to be known within two or three years. The most famous Theclinids in connection with life-history are:

yuasai, a new species described in 1946 for the first time;

fujisanus, one of the rarest Hairstreaks in Japan;

hayashii, a new species distinguished from a sibling by the difference between the two caterpillars; and their foodplants;

ataxus, a brilliant, rare Theclinid (this is called the "Wonderful Hairstreak" in India).

It would be interesting to mention here how the eggs of each of these butterflies were found, but this matter will be put aside.

THE OUTLINE OF THE LIFE-HISTORY OF THE THECLINI

The food of the Theclinids is the young leaf of deciduous trees, which belong to the family Fagaceæ, Betulaceæ, Juglandaceæ, Rosaceæ, Oleaceæ etc.; only *ataxus* feeds on an evergreen tree.

The perfect insects are generally on the wing in June in flat countries, and in mountainous districts, in July. The butterflies, especially the females, may often be found near their foodplants. The eggs are laid on various parts of the tree, such as buds, twigs, branches and trunk, but never on leaves. The place for oviposition, however, is considerably different according to the species. The eggs remain attached there for eight to nine months, but meanwhile a few of them may drop and be destroyed. The hibernated eggs hatch in April or May, just when their foodplants are in buds. The newly-hatched caterpillars first eat their way into the opening buds. After the leaves have spread, the larvæ are usually found on the underside of them, or on the twigs.

The larval stage lasts for three or four weeks, and after the third moult the caterpillar eats very fast and greedily, making ready for pupation. The fully grown larvæ pupate on the underside of the leaves, on the twigs or trunk or elsewhere. The perfect insects come out in about twenty to twenty-five days.

As regards the food, there is an exceptional species — *jonasi*. It lives certainly on leaves, but is ready to catch and devour a kind of aphides too (cf. *Lepid. News* 7: pp. 45-46; 1953).

The three Japanese Strymonids, viz. *mera, w-album,* and *pruni,* are quite similar to the Theclinids in their life-history.

Good Points of Collecting the Eggs in Winter

This method has greatly facilitated obtaining breeding-materials. If we want to breed a Theclinid, we may, for instance by *beating,* get some caterpillars, but to collect the eggs is superior to this in many points.

To specify the merit:

i. Breeding begun with the egg-stage enables us to observe the caterpillar all through its life.

ii. Winter is the most suitable season for searching for eggs, as there would be no other things to be collected than hibernating eggs, larvæ or pupæ.

iii. Above all, it is comparatively easy to collect the eggs, and in some cases pretty many eggs can be obtained. In winter no eggs are distinct in color, so that detecting the tiny Theclinid eggs might seem to be quite difficult. But a collector will soon find it not always so after a few visits to the wood where the butterflies frequent. If a Theclinid lives in flocks in a limited part of the haunt, its eggs can be found very easily. Generally speaking, however, the rarity of adult insects is not necessarily in proportion to the difficulty of detecting their eggs.

It often happened in Japan that eggs of a Theclinid were discovered where the parent butterflies had never been collected. For example, the first record in the Suzuka-range of rare *fujisanus* was not of the perfect insect, but of the egg laid upon the winter bud of a beech tree, which was collected in January, 1952; later, however, the butterfly was also caught there. Without this method, it would be extremely difficult to obtain perfect *fujisanus*.

How To Find The Eggs In The Wood

As mentioned before, the foodplant of a species can probably be found out by observing the female butterflies. We may, though not often, come across a female butterfly in the act of laying. Then we have only to watch her.

In general, what are of great importance to the collector are the place where many females have been caught, and the tree on which they have been sitting. In this regard, however, the male butterflies do not suggest a good place for collecting eggs. It seems that the males like to fly very high, often far away from their pupation places.

Needless to say, the collector is required to be able to identify the foodplants in winter, since most of them are deciduous. Moreover, he had better endeavor to observe in advance the behavior of the female butterflies and remember both the exact place and the tree. This would possibly save him much time, and would produce satisfactory results.

Table 1. The foodplant and ovipositing habit of each species of Theclini. (Original by K. Hayashi, 1952; revised by the author, 1955.)

	Species	Foodplants	Places of Oviposition[1]	Number of eggs laid at a time[2]
1.	*Shirozua jonasi*	*Quercus dentata* *Q. acutissima* *Q. serrata*	D. (where aphids swarm)	I. (rarely II)
2.	*Japonica lutea*	various *Quercus*	B	I or II
3.	*J. sæpestriata*	*Q. acutissima* *Q. serrata*	B, A	I
4.	*Coreana ibara*	*Fraxinus longicuspis*	D	II
5.	*C. raphealis*	*Fraxinus*	?	II
6.	*Artopoetes pryeri*	*Ligustrum ibota*	B, C	II, III
7.	*Araragi enthea*	Juglandaceæ	B	I or II
8.	*Antigius attilia*	*Quercus* spp.	B, C, A, D	I or II
9.	*A. butleri*	*Q. dentata* *Q. crispula*	in cracks of bark	II
10.	*Wagimo signata*	*Quercus* spp.	A	II
11.	*Iratsume orsedice*	*Hamamelis*	A	I
12.	*Favonius orientalis*	*Quercus* spp.	on branching points, or on trunk	I or II
13.	*F. jezoenis*	*Q. crispula*	D	I
14.	*F. hayashii*	*Q. dentata*	A, B, C, D	I
15.	*F. yuasai*	*Q. acutissima*	A	I
16.	*F. ultramarinus*	*Q. crispula* *Q. dentata*	A	I
17.	*F. saphirinus*	*Q. dentata*	B, A	I or II
18.	*F. fujisanus*	*Fagus*	B, A	I
19.	*Neozophyrus taxila*	*Alnus* spp.	D, A, B, C	III or II, I
20.	*N. aurorinus*	*Quercus crispula*	A	I
21.	*N. smaragdinus*	*Prunus* (cherries)	B, C, D	I
22.	*N. ataxus*	*Cyclobalanopsis acuta*	A	I
23.	*N. hisamatsusanus*	unknown	?	?

Supplement on Japanese species of *Strymonidia.*

1.	*Strymonidia mera*	*Rhamnus*	B	I or II
2.	*S. w-album*	*Ulmus*	various parts	I
3.	*S. pruni*	*Prunus*	?	?

[1] Places of oviposition: A — near the winter buds; B — on the twig; C — on the branch; D — on a rough surface, or in cracks of the trunk.

[2] The number of eggs deposited at a time: I — single, sometimes double; II — several; III — many, laid in batches.

Each Theclinid has its own way of laying. The eggs are laid near the winter buds (Type A); on the twig (B); on the branch (C); on the rugged surface, or in the crack, of the trunk (D); the number of eggs deposited at a time being single (I); several (II); many, laid in batches (III). See Table I. for the foodplant and ovipositing habit of each species. In addition to the Theclinids, two Strymonids (*mera, w-album*) are on the Table.

The eggs of most of these species that have a tendency to live in flocks are easily obtained. They are usually laid at the base of the winter-buds or on them, otherwise in the forks of twigs as well as on the twigs. As for the species having wide-spread but sparse distributions, a greater effort must be made in order to obtain their eggs, and the same thing applies to such butterflies that lay their eggs on the rugged surface or on the twigs at very high levels.

The eggs are never evenly laid on the trees in a haunt. Almost always there are but a few trees which the females prefer for oviposition. An experienced collector would readily find them out.

The female butterfly does not deposit her eggs exclusively at higher levels of the tree, but often lays at lower levels as well. Table II will perhaps serve as an example. There is shown in this the relation between the number of eggs and the height at which they were found.

Table 2. Relation between the height from the ground and number of eggs of *Neozephyrus ataxus* (from Takita, K., 1952).

Height (in cm.)	Number collected
lower than 25 cm.	3
25——— 75	19
75———125	25
125———175	17
175———225	12
higher than 225	9

As a matter of fact, this method consists in laborious climbing and attentive observation. In search of eggs we will have to cut off or bend branches, and in some cases the whole tree should be cut down for the sake of close and efficient examination. But it is not preferable to cut further than the branch.

Preservation Of The Collected Eggs; Treatment Of The Newly-hatched Larva

The rate of hatching of the collected eggs may be low, if they are preserved in a room. The twigs or pieces of bark with the eggs should be hung outdoors, more or less exposed to rain and snow.

The time of hatching exactly corresponds to the budding season of the foodplant. Toward this time all the eggs must be examined about twice a day, lest the minute young caterpillars should creep out unnoticed and be lost. On, hatching, the larva makes an opening in the center (*i.e., micropyle*) of the egg. The larva remains in the egg-shell for a pretty long time after having finished the opening. When an egg is seen making the hole, it would be better to put all the eggs of the same species into a glass receptacle or petri-dishes, together with some opening buds as food. If a hatched caterpillar is found on the twig or fragment of bark, it should at once be transferred to a bud on the soft hairs of a small brush, or on a feather. It is desirable to put a piece of gauze between the dish and the lid, or else the larva may escape through the gap. Once the caterpillar begins to eat, there would be no particular difficulties about the breeding. The only trouble is that the caterpillar of some species may turn *cannibals* as they grow bigger, yet this would quite easily be avoided.

Epilogue

In the preceding paragraphs I have introduced the method of collecting the eggs of the Japanese Theclinids and Strymonids. As for the Theclinids that are absent in Japan, three species, namely *quercus, betulæ* and *roboris* are said to feed in Europe on *Quercus, Prunus,* and *Fraxinus* respectively; in America there are two Theclinids — *grunus* and *chrysalus,* and the known foodplant for both is also *Quercus.*

The Himalayas, from 7,000 up to 8,000 feet in height, are the haunts of many splendid Theclinids. Their life-histories are still neglected, excepting *birupa* and *odata.* The former lives on *Rhododendron,* and the latter, on a certain walnut tree. In my opinion, it certainly seems that many Himalayan Theclinids are *Cyclobalanopsis* eaters like *ataxus.*

In conclusion, if these notes give a clue to the breeding of the Theclinids whose life-history is still unknown, and if this method were to accelerate success in breeding the North American Strymonids as well, nothing would be greater than my delight and satisfaction.

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P. S. According to Dr. T. Esaki (*Kontyu* 21: pp. 33-35; 1954): *F. ultramarinus* in this text should be treated as *F. cognatus jozanus* (Matsumura), and *F. hayashii* in this text should be treated as *F. ultramarinus* Fixsen. "*N. ataxus*" in Japan is a good species (*N. kirishimaensis* Okajima) separable from *N. ataxus* Doubleday & Hewitson.

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