



I. C. FABRICIUS

Nat. d. 7 Januar. 1745.

*Tabula ad Vivum del. a J. G.*

*Hæretic. 1805.*

# THE ENTOMOLOGIST, J. C. FABRICIUS

By S. L. TUXEN

*Zoological Museum, Copenhagen, Denmark*

## OTHO FABRICIUS AND J. C. FABRICIUS

The symbols, F. and Fab., or Fabr. written after a species name are familiar to all entomologists, and everybody knows that they signify the well-known Danish entomologist, Johann Christian Fabricius. It is not generally known, however, that there is another Fabricius, a remote relative of J. C. Fabricius, namely, Otho Fabricius (1744–1822) who was a curate in Greenland in 1768–73 and wrote the famous "*Fauna Groenlandica*" (1780). In this book he described the Greenlandic animals known to him, 468 species, of which more than one fourth were new species. Since he used the Linnaean nomenclature, the descriptions are valid and should carry the author's name, O. Fabr. Twelve insects are described as new in *Fauna Groenlandica* and 51 others (plus 16 arachnids) are mentioned. After each heading the word "Groenl." and a Greenlandic word is given; the latter is not a locality in Greenland, but the Greenlandic name of the species. The types of the 12 new species are not extant.

This paper, however, does not deal with Otho Fabricius, but with J. C. Fabricius. Such an article at this time might appear to be superfluous, since the book by Ella Zimsen (1964) entitled "*The Type Material of J. C. Fabricius*," gives details of the whereabouts of all of the Fabrician species and also the background for his descriptions; in fact, anyone in doubt as to some Fabrician name or species must consult this work. The justification for the present paper, therefore, is to serve as a reference to the Zimsen work and to round off the picture of Fabricius by elaborating also on other sides of his activities.

## FABRICIUS' LIFE

Fabricius wrote an autobiography in Danish (*Lahde's Portraeter* 1805 translated into English by Hope, Transactions London Entomological Society, 4, I–XVI, 1847), and in German (published in Kieler Blätter 1819, but written in 1798). He also gave some biographical details in the preface to his book *Über Akademien* 1796. Since that time, various biographies have been written, the most recent by Ella Zimsen in the above-mentioned book. Only a few important facts will therefore be given here.

Fabricius was Danish. Though Burmeister in 1832 (*Handbuch der Entomologie*, 1, 666), wrote: "Dieses Genie erstand unter den Deutschen" and though the Deutsche Entomologische Gesellschaft in Berlin in 1941 instituted a medal "zum Gedächtnis des grossen deutschen Entomologen

Johann Christian Fabricius<sup>1</sup> there can be no doubt as to his native country. He was born January 7th, 1745 in Tønder in South Jutland which was and is Danish. He was a professor first in Copenhagen and later in Kiel in Holstein, which at that time belonged to the Danish Crown, and he always felt strongly attached to Denmark.<sup>2</sup>

His broad minded, although not wealthy, father gave him a very free education, permitting him to follow his inclination for natural history and allowing him to study for two years, 1762–64, with Linnaeus in Uppsala. His description (*Deutsches Museum*, 1780 I, 432) of the three foreign students (an American botanist, Kuhn and the two Danes) in their garret opposite Linnaeus' house being visited every morning at six by their teacher attired in a small red gown, green fur cap and smoking a long pipe, is most charming. In the summer they lived in a farm house near Hammarby and often gave parties for the family of their teacher who, himself, at the age of 55 ('Alte'!), now and again took part in a "Polsk" dance "in which he surpassed all of us." Fabricius was devoted to Linnaeus throughout his life.

Though a professorship suited for him had been vacant since 1759, he did not get it on his return to Copenhagen from Uppsala, so he began travelling in Europe. Forced by circumstances, he became a great traveller throughout his life, though he did not travel to collect but to study the collections of other entomologists. In this way, he became acquainted with most of the naturalists of his day and had access to all of the important collections. He travelled in Central Europe during 1765–66, in Holland in 1766–67, in Scotland in 1767–68, and in 1768–69 in France, Italy, and Germany. In 1768 he was appointed to the professorship at the Charlottenborg-Institution in Copenhagen with permission to travel for another two years, but when he finally returned his professorship was transferred to the University and the salary very much reduced. Finally, the fall of Struensee on January 17th, 1772, upset all plans. In 1775 he left Copenhagen to take up a professorship in Kiel, but, again, his justified expectations were disappointed; he did not get the necessary facilities for work. In 1789 he wanted to resign and take up a position in London, but the students persuaded him to stay and so he withdrew the petition. He had already packed his luggage to go abroad and he never unpacked. He gave his lectures in Kiel in the winter season and travelled during the rest of the year. From 1796 his wife lived in Paris and he went every year in the spring to Copenhagen to study the collections of his pupils Sehested and Tønder Lund, and in summer to Paris. He died in Kiel,

<sup>1</sup> The President of the Society, Dr. H. Hedicke, Berlin, offered sincere excuses to me in a letter of 17. February 1944, but, to my knowledge, never in print.

<sup>2</sup> It is, however, wrong when Bryk (1945, p. 56) and later authors, write that he registered in Uppsala as "Danus." He registered as Joannes Christianus Fabricius Holsatus (A. B. Carlsson, *Uppsala Universitets Matrikel 1750–1800*, Uppsala, 1925–46). His birth year is stated herein as 1742 which, however, was the birth year of his fellow student and cousin, the botanist, Zoëga.

March 3rd, 1808, broken, as his wife said, by the news of the British bombardment of Copenhagen in 1807.

From the year 1770, his travels were as follows: in 1770 he went to Slesvig and Holstein (Denmark); the summers of 1772 to 1775 were spent in London which he particularly loved; in 1778 he went to Norway; in 1780 and 1782 to London again; 1784 was spent in Germany and Austria; 1786 in St. Petersburg; 1787 was spent in England; 1790–91 in Paris; 1794 in Switzerland; 1796 onward, in Paris and Copenhagen. He published a book on his travels in Norway (*Reise nach Norwegen*, Hamburg, 1779), in which Thunberg described the plant genus *Fabricia* with six species on pages 23–32, while Fabricius described some insects on pages 33, 54, 63, 64, 165, 168, 169, 181, 185, 187, 192, 196, 231–32, 233–34, 248–50, 253–54, 258, 262–63, 264, 281–84, 301–2, 305–6, 317–18, 319, 328–29, 334, 339–40, 344–46, 359–60, 382–83. Other "Letters" from his journeys are *Briefe aus London* (Dessau, 1784), *Briefe aus Wien* (Hist. Portefeuille 1785–86) and "*Briefe aus Petersburg*" (Hist. Portefeuille 1787). No new descriptions are published in these "Letters," but many interesting facts are given on collections and scientists.

There is little purpose in listing all of the scientists he met. They were, in fact, everyone who counted at that time.

#### FABRICIUS' WRITINGS

Fabricius' professorships both at Copenhagen and Kiel had the title: Professor in Natural History, Economy and Finance ("Cameravidenskaberne"), natural history at that time being justified only in connection with economy. So, he had to devote a great part of his time to this science. As a student in 1765 he went to Schreber in Leipzig to qualify in Economics, and he lectured and wrote many books on this subject which are of no interest here, although it is interesting to note that in economics as in entomology he seems to have been ahead of his time. Only one of these books is important to us: *Über Akademien insonderheit in Dännemark*, 1796, which gives some biographical dates in the introduction and a picture of Linnaeus on page 80. Another book was called *Cultur der Gewächse*, 1784 ("Sanders Naturgeschichte für Landleute, 4ter Theil") and was meant to be used by the farmer.

Fabricius' books on systematic entomology are the following:

*Systema entomologiae*, Flensburgi et Lipsiae 1775, 832 pages.

*Genera insectorum*, Chilonii sine anno; preface dated 26. December 1776, 310 pages.

*Species insectorum*, Hamburgi et Kilonii 1781, I–II, 552 and 517 pages.

*Mantissa insectorum*, Hafniae 1787, I–II, 348 and 382 pages.

*Entomologia systematica emendata et aucla*, Hafniae, I, 1792, 330 and 538 pages; the latter half also marked as Tom. I, Pars II; II, 1793, 519 pages; III, 1, 1793, 487 pages; III, 2, 1794, 349 pages; IV, 1794, 472 pages; *Index alphabeticus*, 1796, 175 pages; *Supplementum*, 1798, 572 pages; *Index alphabeticus in . . . Supplementum*. 1799, 52 pages.

*Systema eleutheratorum*, Kiliae 1801, I–II, 506 and 687 pages; *Index alphabeticus*, Helmstadii 1803, 93 pages.

*Systema rhyngotorum*, Brunsvigae 1803, 314 pages; *Index alphabeticus*, 1803, 23 pages.

*Systema piezatorum*, Brunsvigae 1804, 439 pages; *Index alphabeticus*, 1804, 32 pages.

*Systema antliatorum*, Brunsvigae 1805, 372 pages; *Index alphabeticus*, 1806, 32 pages.

*Systema glossatorum*, Brunovici 1807. This book had a curious and tragic fate which will be related in the next section.

As to the Fabrician names of the orders in the *Systema* books, the following may be said:

Eleutherata = Coleoptera.

Rhyngota = Hemiptera, but also comprising Thysanoptera.

Piezata = Hymenoptera.

Antliata = Diptera, but also comprising Anoplura, Acarina.

Glossata = Lepidoptera.

A few other systematic papers are:

*Nähere Bestimmung des Geschlechts* [i.e., genus] *der weissen Ameise*. Beschäft. d. Berliner Gesellschaft naturforschender Freunde I, 1775, 177–80.

*Nova insectorum genera*. Skrifter af Naturhistorie-Selskabet Kjøbenhavn, I, 1, 1790, 213–28.

*Determinatio generis Ips affiniumque*. Actes Société Histoire naturelle. Paris, I, 1, 1792, 27–35.

*Cychrus, en ny Insekt-Slæggt*. Skrifter af Naturhistorie-Selskabet Kjøbenhavn, III, 2, 1794, 68–71, Tabula VII.

A few papers on his insect system are:

*Betrachtung über die Systeme der Entomologie*. Schriften Berliner Gesellschaft naturforschender Freunde, II, 1781, 98–115.

*Om Skrifter i Insekt-Læren*. Skrifter af Naturhistorie-Selskabet Kjøbenhavn, III, 1, 1793, 145–56.

*Vertheidigung des Fabricischen Systems*. Illiger's Magazin f. Insektenkunde, II, 1803, 1–13.

Some biological papers are:

*Om Høre-Redskaberne hos Krebs og Krabber*. Kongelige Danske Videnskabernes Selskab Skrifter Nye Samlinger, II, 1783, 375–78, in which he describes “ears” in crabs and crayfish (the static organs) and deduces that since insects produce sounds they must be able to hear, and not be “muta surdaque,” as Linnaeus thought.

*Beskrivelse over den skadelige Sukker-og Bomulds-Orm i Vestindien og om Zygænæ Pugionis Forvandling*. Skrifter af Naturhistorie-Selskabet Kjøbenhavn, III, 2, 1794, 63–67, Tabula VII, with biological notes told him by von Rohr. Fabricius was never in America.

*Einige Bemerkungen über den Winterschlaf.* Magazin f. d. Neueste aus der Physik und Naturgesch., IX, 4, Gotha. 1794, 79–81.

Finally, the most important book of all and one of the most important books in entomology of all times:

*Philosophia entomologica.* Hamburgi et Kilonii, 1778, 178 pages.

And two interesting general books:

*Betrachtungen über die allgemeinen Einrichtungen in der Natur.* Hamburg, 1781. 360 pages.

*Resultate natur-historischer Vorlesungen.* Kiel, 1804, 428 pages.

### SYSTEMA GLOSSATORUM

The last of Fabricius' *Systema* books had a tragic fate which is not known in all details (Bryk 1938, Langer 1957).

The manuscript of *Systema glossatorum* was finished March 4th, 1806 and sent to the same publisher in Braunschweig who had published all of his "*Systemae*" except the first one. This printer (or publisher) also published the *Magazin für Insektenkunde* by Illiger ("Illiger's Magazin"). In the sixth and last volume of this journal Illiger wrote a paper "Die neueste Gattungseintheilung der Schmetterlinge aus den Linnéischen Gattungen Papilio und Sphinx," 1807, pp. 277–289. This paper was based on "der erste Band jenes *Systema Glossatorum*," and was published because the book itself could not appear before Easter (1808). Fabricius disliked this note and gave a preliminary abstract of his book in "Zeitung für Literatur und Kunst in den Königl. Dänischen Staaten," Kiel, 11. Sept. 1807 (pp. 81–84) under the title: "*Etatsrath Fabricius Rechenschaft an das Publikum über seine Classification der Glossaten. Joh. Christ. Fabricii systema glossatorum, Vol. I*".

The book itself was never published. This statement of many authors is justified when made in this precise form. Nevertheless, part of it was printed, but during the printing the publisher went bankrupt and the creditors closed the shop and sold everything, including all of the "waste" paper. What happened to the manuscript is not known. The first seven sheets, however, were printed and somehow three copies were saved. Their fate is not completely known, but the following can be said.

One copy was saved by J. L. Friedrich Zinken genannt Sommer (Nova Acta Acad. Leopold., 15, 1831, pages 135–36). It is now in the library of the Zoological Museum in Berlin. This copy comprises the seven sheets, pages 1–112, including the title page. The title is *Systema glossatorum*, but not Volume I. It is published in facsimile by F. Bryk in Feller's Sammlung naturwissenschaftlicher Facsimile-Drucke, Neubrandenburg, 1938.

Another copy belonged to K. A. Dohrn in Stettin. How it came there we do not know. It was bequeathed by him to the Zoological Museum in Stettin, from where it went, after the second world war to Poland, and was presented in 1956 by the Polish State to the Royal Library in Copenhagen. It comprises pages 3–112, i.e., without the title leaf.

And, finally, there is a copy in the American Museum of Natural History

in New York where it has been since at least 1903. It comprises only pages 1–80, i.e., including the title page (kindly checked by Dr. Alex B. Klots, New York).

Dohrn (*Entomologische Zeitung*, Stettin 17, 1856, p. 63) mentions that part of the stock of Illiger's *Magazin*, Volume 6, was destroyed by a fire at the printing establishment and Bryk proposes that Fabricius' manuscript was burned. This would be a better explanation than that of Zinken, but we do not know for certain.

It is probable that the original manuscript was meant to be only volume I, since the list of genera with which Fabricius begins (p. 9–12) does not comprise noctuids and geometrids, etc. In his *Rechenschaft*, Fabricius mentions that he is going to change many Linnaean specific names, for example, since he wanted the names to state the food plant of the larvae. He also writes that he will give the butterflies names which, in mythology, belonged to Venus, and to the moths, names belonging to Diana. "Sie schienen mir die passendsten zu seyn."

## FABRICIUS AS A SYSTEMATIST

### HIS BASIC THOUGHTS

Fabricius has been called the "Linnaeus of insects" (Steffens 1842) and it is true that to Linnaeus' 3000 species of insects Fabricius added another 10,000. But that is not the main point. Fabricius' contribution to the system of Linnaeus was that he based his "genera" on more natural characters. And that was not by chance, but the result of thorough reflection which makes his book, *Philosophia entomologica*, so important.

*Philosophia entomologica* is what we would now call a general textbook of entomology, the first in the world, comprising the following sections: Literature, Morphology, Mouth-parts, Metamorphosis, Sex, Systematics, Nomenclature, Distinguishing characters, Description ("Adumbrationes"), Ecology and Biology ("Oeconomia"), and Applied Entomology ("Usus"). Its format is patterned much like Linnaeus' *Philosophia botanica* (1751), with short phrases, almost theses, illustrated by examples. These theses mostly represent quite modern and very clear thinking; *Numerus specierum in entomologia fere infinitus et nisi in ordinem redigantur, chaos semper erit entomologia*, "the number of species in entomology is almost infinite and if they are not brought in order entomology will always be in chaos" (VI, 3, i.e., section VI, ¶3). Often, the theses are truly poetically formed: *Nomina si pereunt, perit et cognitio rerum*, "if the names are lost the knowledge also disappears" (VII, 1). Often, too, quite small points are mentioned: *Nomina generica sesquipedalia, enunciata difficilia et nauseosa semper fugienda*, "generic names with more than twelve letters should always be avoided, since they are difficult to pronounce and awkward" (VII, 32).

There are two important basic thoughts in Fabricius' system. First, he quite clearly distinguishes between artificial and natural characters, i.e.,

those which are useful only in determining the species, and those which show relationships: *artificialis, quae classes et ordines, vel naturalis, quae genera, species et varietates docet*, "artificial with respect to classes and orders, natural with respect to genera, species and varieties" (VI, 2). It should be noted that Fabricius uses the word "classis" for our orders, and orders for our families; furthermore, he never named an "order" (i.e., family); the sequence of the species indicates their relationship. He knew that the genera could be arranged in a natural system, but he was afraid that the time had not yet come for it. The genus was most important to him;<sup>3</sup> in fact, he regards the genus as a natural combination of species, the "orders" and "classes" as artificial. Thus, his first work gave the system (*Systema entomologiae* 1775), his second, the genera (*Genera insectorum* 1776), and only then came his true species surveys. He did not doubt that natural classes exist, only that it was too early to elaborate them (VI, 7). Artificial systems are based on only one character, natural characters comprise all generic marks (*notas omnes genericas*). In botany, Linnaeus had already begun to form natural classes, but not in zoology.

Linnaeus distinguished the insect "classes" according to the wings, whereas Fabricius used the mouthparts which, in VI, 10, he called *dispositio artificialis*, but which for example, in VI, 28 he called a natural character: *Ego primus in Entomologia characteres naturales composui, introduxi*. In this, Fabricius was right, since the mouthparts offer so many different characteristics that they form a real set of characters.<sup>4</sup> The wings might have offered the same had Linnaeus used their nervation, etc., but he used only their number. Fabricius, however, went so far as to use the characters of the mouthparts to distinguish all his genera, a task which was bound to fail as the number of the new species increased. He knew this himself and when he came to the "Class" Glossata (Lepidoptera) he introduced the character of the antennae, because the mouthparts in this class were so very much alike.

And there is another important point to mention with respect to Fabricius' preference for using the mouthparts as distinguishing characters: he knew why he did it. In 1790, he described some "nova insectorum genera" and here he says (p. 214, translated from the Danish): "The mouthparts in insects differ to a high degree and it is reasonable that they mark the most natural genera, since these parts must be built up according to the nourishment of every insect, and their whole biology is dependent on their nourishment. . . . Those whose nourishment and biology are the same, must then also belong to the same genus". Though this has not proved to be correct in every detail, it represents much more modern thinking than is found in the

<sup>3</sup> In his German works he uses the word "Geschlecht" for genus, not for sex. This is an old usage.

<sup>4</sup> In 1803 (*Vertheidigung*), Fabricius anticipated modern systematics in saying (translated from the German): "If we could depict, e.g., the genitalia in these animals they might be good characters, but they are still smaller than the mouthparts and I would say with Linnaeus: *Genitalium disquisitio abominabilis displicet!*" (p. 5).

writings of his admired teacher, Linnaeus. But it must be noted that Linnaeus, as early as 1740 (*Systema Naturae*, 2nd ed.), had proposed a study of the mouthparts of the insects<sup>5</sup> and that he welcomed Fabricius' proposal (in a letter of 1766 published in *Naturhistorisk Tidsskrift*, (3), VII, 1871 pp. 467-68) to do so.

#### FABRICIUS' SPECIES. COLLECTIONS AND COLLECTORS

To all entomologists the species must be the foundation and this was certainly the case with Fabricius. He combined the species into "natural" genera, but the species were the base, and varieties were only "different insects which appeared from the same species' eggs" (*Philosophia entomologica*, VI, 5). The principal work, therefore, was to describe species, and all of his systematic books, including "*Genera insectorum*," contain many new descriptions. In all, Fabricius described a total of 9776 species which are listed in Ella Zimsen's book (1964).

From his first to his last book, the new species were described in the same very short manner: the name, a diagnosis of never more than two lines, and a reference to the locality and collector. The locality was given in the broadest sense: ex America septentrionali, Novae Hollandiae, in Italia Dr. Allioni, and so forth. Ella Zimsen has given this locality-collector reference for every species. In his later books he sometimes added some "adumbrationes", i.e., more explicit descriptions, and perhaps also comparisons with related species.

Fabricius also described, in the same manner, the species which were already known, as, for instance, Linnaeus' species and many others, giving, in most cases, a reference with synonymy. On the other hand, he did not always (but most often did) refer to his own earlier books, and then especially when he had changed the name for one reason or other.

Fabricius did not have the concept of type specimens that we use today, and this may render difficult the explanation of what he meant by this or that species. For this reason, among others, Ella Zimsen's book is indispensable to everyone working with Fabrician species, because it tells where to find the specimen or specimens on which Fabricius based his descriptions.

Though Fabricius travelled more than most naturalists of his time, it seems that he collected very little for himself. In mentioning his journeys, he generally states that in this or that town he had occasion to study the collection of Mr. So-and-so who was "kind enough to present me with a great many species." Thus, he had a collection, but for the greater part, collected by others.

Ella Zimsen realized that in the locality-collector reference Fabricius might give only the locality and collector, or he might add: "Mus." and then a name (Mus. Dom. de Bosc; Mus. Dom. Banks; Mus. Dom. Lund; etc). From this she inferred, though it is nowhere stated explicitly in his books, that

<sup>5</sup> p. 77: *Character essentialis genericus . . . insectorum ab ore . . . primario desumendus est.*

in the latter case he had described the species on material in other people's collections, while in the first case the "type specimen" was to be found in his own collection. Her work, based on this axiom, showed this to be the case.

The most important collection on which Fabricius based his descriptions was made by two of his pupils in Copenhagen, O. R. Sehested and Niels Tønder Lund (the reference by Fabricius to "Mus. Dom. Lund" means the latter's collection and has nothing to do with the Swedish town of Lund). The two students studied in Kiel during 1776-78, where they became very good friends with Fabricius. They started and continued a collection of insects, partly collected by themselves, but mostly received from friends abroad. These friends now and again sent insects also to Fabricius in Kiel. Whenever he was in Copenhagen Fabricius examined their collection, and in his later years he went once a year to Copenhagen for this purpose. Both pupils advanced to high positions in the Danish government, and after the death of Tønder Lund the collection was bought at a formidable price by the Danish government and given to the Zoological Museum in Copenhagen where it still exists, wonderfully kept. About one third of the Fabrician types belong to this collection. In the 1830's some duplicates from this collection were exchanged with other museums, and in this way some "Fabrician types", i.e., syntypes, became dispersed, e.g. to the Berlin Museum, and were marked later with a type label. This is the reason for some earlier redescrptions of Fabrician species based on such material.

Fabricius' own collection stayed in Kiel after his death and belongs to the Zoological Museum of Kiel. It is partly in a bad state, especially the Diptera. In 1950, it was transferred to the Zoological Museum of Copenhagen where it is now kept as a "Dauerleihen" from the Museum of Kiel. Another third of the Fabrician types are found in this collection. In some cases the same collectors sent material to both Fabricius and Sehested-Tønder Lund, so that the whole material may be regarded as syntypes.

The final third of the Fabrician type specimens is found in many museums, especially Paris (de Bosc et al.), British Museum (Banks et al.), and Glasgow (Hunter). The last-mentioned collection was redescrbed by R. A. Staig in 1931-40.

A more elaborate statement as to the origin of the Fabrician types is superfluous, since every detail, including notes on the collectors, may be found in the introduction of Ella Zimsen's book. Fabricius himself gave a list of the collections visited to the year 1780 in the introduction to *Species insectorum*, pages IV-V, and again in 1787 (*Mantissa* pages IV-V), and in 1792 (*Entomologia systematica*, pages III-IV).

#### PITFALLS FOR STUDENTS OF FABRICIUS' WORKS

It is not an easy matter to find out whether a specimen is one that is mentioned by Fabricius. It is the merit of Ella Zimsen to have unravelled the tangled threads in this respect. There may be reasons of labelling for this diffi-

culty, but there is also another reason which Fabricius himself mentions in 1803 ("Vertheidigung," pages 10–11). He had to describe many species seen in others' collections on his journeys, and so it happened that he put the same insect in two different genera. "In my youth this did not easily happen, my memory was better and my eye sharper; now both are weaker . . ." In his later works he corrected earlier errors, but probably introduced new ones, he says. Ella Zimsen follows the status of such species from book to book. There may also be misprints, omissions, locality-collector references displaced from one species to the next, and so on. Now and again he also changed the name of a species in an "Emendata" list on the last page. With so many species to deal with this is not surprising.

A few authors have their names more or less intermingled with those of Fabricius. It is not my intention to enter into questions of nomenclature but merely to mention some facts.

Friedrich Weber (1781–1823) was a devoted pupil of Fabricius. At the age of fourteen he published a *Nomenclator entomologicus*, and at twenty the *Observationes entomologicae* (Kiliae 1801), with descriptions of new genera and species. Fabricius' *Systema eleutheratorum* came out in the same year, and it is quite casual whether Weber's species are cited in it or not. For example, of Weber's first 14 species, *Geotrupes monoceros* is not mentioned, *G. dentatus* and *Copris conspicillatus* are described without Weber's name; *C. bidens*, *Ateuchus histeroides*, and *Hister pulcherrimus* are not mentioned; *Opatrum hispidum* and *sericeum* are described as Weber species; *Erodium cassidoides* is not mentioned; *Tenebrio impressus* is described, but a species other than Weber's of the same name, *T. aeruginosus* is described as a Weber species; *T. cyanicollis* is not mentioned; and *Trogosita elongata* is described without Weber's name. It is not easy to find a rule here; from Fabricius' collection, however, it looks as if only species which he himself had were mentioned, with or without a reference to Weber! In *Systema rhyngotorum*, which appeared in 1803, Weber's species are not mentioned at all.

A. J. Coquebert (1753–1825). Fabricius gave some few drawings of his species in his smaller papers, but never in his books. Coquebert, however, published a most beautiful work, *Illustratio Iconographica Insectorum, quæ in Musæis parisinis observavit et in lucem edidit Joh. Christ. Fabricius*, Parisiis Anno VII, X, XII (1799, 1802, 1804), 142 pages and 30 plates. It gives references to Fabricius' descriptions, and Fabricius, again, in his later books, gives references to Coquebert. These pictures, which are not only beautiful, but also correct, elucidate some of Fabricius' very short descriptions.

A. G. Olivier (1756–1814) was another entomologist with whom Fabricius was in contact in Paris. He published an extensive work, *Entomologie, ou histoire naturelle des insectes. Coléoptères*. The six volumes were published in Paris as follows: Tome I, 1789; II, 1790; III, 1795; IV, 1795; V, 1807; VI, 1808. During his stay in Paris, Fabricius must have seen the plates of this work a long time before they were actually published, for he often cites them correctly even 18 years before they appeared in print. So we have a curious

situation in which Fabricius and Olivier give cross-citations to their works. To take an example:

In *Entomologia systematica*, I, 1792, p. 306.67<sup>6</sup> under *Cassida 6pustulata* Fabricius cites: "Oliv. Ins. 97 tab. 3 fig. 36." This table was actually published in volume VI of Olivier's work in 1808, and in it Olivier cites: "*Cassida 6pustulata* Fab. Ent.Syst.Em. I. p. 306. n. 67." He also cites Fabricius in "Syst.Eleut.I. p. 408. n. 116" published in 1801, and in this place Fabricius cites Olivier exactly as above. In some cases there may be disagreements as, for example, when Fabricius, in 1792, pages 307.68 under *Cassida 16punctata*, cites "Oliv.Ins.97.tab.3.fig.41" (the same in 1801, p. 408, 118), whereas Olivier cites the same species under the name of *Cassida sexdecimpustulata*, but with the correct references to Fabricius' *16punctata*.<sup>7</sup> Fabricius may even cite Olivier without exact table number, e.g., 1792 p. 307.1, *Chrysomela punctatissima* "Oliv.Ins. tab. fig. ".

To summarize: Fabricius and Olivier worked so closely together that they could cite each other *in futuris*.

Ignaz Schiffermüller (1727–1809) was the main author of the anonymous book: *Systematisches Verzeichniss der Schmetterlinge der Wienergegend herausgegeben von einigen Lehrern am k. k. Theresianum Wien 1776*, the preface of which is dated 16th March, 1771. In 1784, Fabricius travelled in Germany and Austria especially to meet Schiffermüller and inspect his collection which, by then, was in Linz. He remained about three weeks and described the insects "according to my system." He must have received some specimens from Schiffermüller, since specimens of his species are present in Fabricius' collection as listed by Ella Zimsen, pages 588–89. In his later works, Fabricius cited Schiffermüller's species as "Wien. Verz.," but sometimes changed the names. Schiffermüller's collection burned in 1848. The species which Fabricius mentioned from "Wien. Verz." are often cited as Fabrician species.

### FABRICIUS AS AN EVOLUTIONIST

All entomologists know Fabricius' importance as a systematist, but not everyone knows that he regarded systematics primarily as a tool for a better understanding of natural science. "As we would not call a man learned merely because he can read, so we would not call a man a scientist who knows nothing but the system" (1804, page 138). Fabricius' general thoughts were put down in his *Philosophia entomologica* (1778), but also in his *Versuch über die Gesetze des Naturreiches* Cramer's Beyträge, Kiel, 2, 1778, pages 72–136, in his *Betrachtungen über die allgemeinen Einrichtungen in der Natur* Hamburg 1781, VIII+360 pp., and in his *Resultate natur-historischer Vorlesungen* Kiel 1804, XX+428 pp.

<sup>6</sup> Meaning page 306, No. 67; Fabricius numbered the species within every genus.

<sup>7</sup> Nevertheless, Olivier was right because Fabricius had already described the species in 1781, I, pages 115–47, as *16pustulata* which he apparently had forgotten in 1792.

In the title of the latter he calls himself "Öffentlicher Lehrer der Naturgeschichte zu Kiel," thus indicating that it contains lectures to the general public, not only to the students; on page VIII he says that it is the result of yearly lectures held and improved through 30 years.

There are certainly phrases in these books which seem quite modern in formulation and thinking. Especially in the 1804 book we find phrases like: "Auf diese Entstehung der neuen Arten, theils durch die Vermischung der schon vorhandenen unter sich, theils durch die besondere Leichtigkeit der äusseren Theile eine neue Figur anzunehmen, und dadurch die festen, in Arten übergehende, Abänderungen zu bilden, gründet sich die ausserordentliche Menge und Mannigfaltigkeit derselben" (page 30) (The enormous number and multiplicity of the species are due to an evolution of new species, partly as a result of hybridization among the species already existing, partly as a result of the facility of the external parts to attain new forms and thus to build up stable varieties which later evolve into species.);—or "die nach und nach in Arten übergehende (sic!) festen Abänderungen" (page 24) (the stable varieties which little by little change into species);—or "die Arten der grössern Affen, aus welcher (sic!) [der Mensch] sich entwickelt zu haben scheint" (page 203) (the species of the bigger monkeys from which man seems to have evolved).

There are many other similar phrases, also in his earlier books, even back to *Philosophia entomologica (ergo copula differentium haud semper eandem speciem certe demonstrat*, "not even copulation shows with certainty that individuals belong to the same species", VI.4, and others). Fabricius also had thoughts about the influence of the environment and even that females prefer the strongest males, etc. Henriksen went so far as to call Fabricius "quite likely the father of Lamarckism" (1932, page 80). Helveg Jespersen (1946) was sharply opposed to the enthusiasm of Henriksen and tried to reduce Fabricius to nothing but a pupil of Linnaeus, claiming that all of Fabricius' thoughts could be followed back to a hint in a Linnean book or lecture.

Not even Linnaeus received all his thoughts from Providence alone; we all depend on the work of our predecessors and Fabricius, in all his books, devotedly recognized Linnaeus as his great teacher. But Fabricius was open to all thoughts of the time, and he had the common sense to choose the important points in a debate and probably add something himself. And he was in close contact with all of the outstanding zoologists of his time.

So we must conclude that he had his—correct—opinions on the "economy of nature" and he taught them to anyone who might want to hear, but he did not claim originality, or he would have said so in his autobiography. It was his duty to think, and since he was an intellectual man his thoughts were clever; but it was in the basic system of entomology he wanted to influence the future, not with his general thoughts.

#### FABRICIUS, THE MAN

The life of Fabricius was strikingly different from that of Linnaeus. Linnaeus was very poor as a student and became very rich, esteemed by his

king and his country, and many people came to visit the great man. But he lived all his life in Uppsala, became conceited, and was not happy in his life with a dull and difficult wife, as Fabricius tells us (*Deutsches Museum*, I, 1780, page 436). In contrast, Fabricius had a protected youth and a happy marriage with an intelligent and brilliant wife, who was far ahead of her time; their life was notorious for their absent-mindedness, as Henrich Steffens tells us (1842, page 199). As a professor he lived on a small salary in the outskirts of his country, got no facilities for his studies or help from his country, and was literally forced to travel to improve his studies. His duties as a professor, furthermore, included politics and political economy, etc. In this way, however, he attained a broader horizon than did his beloved teacher; he took part in discussions on nearly everything concerning the politics of his time and he was acquainted with all and sundry within his science.

He was a very modest man, never wanting anything for himself or his children ("Stipends are alms—and I have never wished to deprive such persons as had more need of it"), and seemingly a well-balanced man, beloved by everyone. He describes himself in his autobiography: "A healthy body, a light heart, and an easy mind, raised me above many troubles. Continual employment in my favourite science, which is itself inexhaustible, but which I cultivated with great pleasure, and not without success, kept up my ardour in the pursuit, and diffused peace and happiness over the whole course of my life." A faint irony appears in many of his works, especially the political ones, but who knows if it is not present in the following phrase from *Mantissa* (I, page III): "*Verbositas praeclerea summa entomologiae calamitas*": "Too many words are the real trouble of entomology". What would he have said about entomology today?

## LITERATURE CITED

- Fabricius has written on many topics beside entomology and a complete list of his publications, with translations, new editions, and comments has never been given. In preparing the present paper I reviewed his entire bibliography, but as only part of it is entomological its proper place is not in this present chapter. It will be published in *Zoologischer Anzeiger*. References to the most important of his books and all his entomological books and papers have been given in the text.
- Bryk, Felix, 1922: Fabricius, Linné's mest framstående lärjunge en dansk preदारwinist. *Aftonbladet Lördagen den 1. April 1922*.
- 1938: Einleitung. In: *J. Chr. Fabricius, Systema Glossatorum*. Facsimile-Druck. Neubrandenburg, VII–XII.
- 1939: Über ein wichtiges verschollenes Werk von Fabricius. *Verhandl. Intern. Kongr. Entomol. Berlin*, I, 535–39.
- 1945: Till dansken Johan Christian Fabricius' 200-årsminne. *Sv. Linné-Sällsk. Årsskr.*, 28, 55–59.
- Gosch, C. C. A., 1873–78: *Udsigt over Danmarks zoologiske Literatur*. København. II, 1, and III.
- Henriksen, Kai L., 1922–37: *Oversigt over Dansk Entomologis Historie*. *Entomol. Medd.*, 15.
- 1932: Johann Christian Fabricius. *Prom. Dan. Scientists*. V. Meisen, Ed. Copenhagen, 76–80.
- Jespersen, P. Helveg, 1946: J. C. Fabricius as an evolutionist. *Sv. Linné-Sällsk. Årsskr.*, 29, 35–56.
- Langer, Torben W., 1957: Et sjældent sommerfugleværk. J. C. Fabricius' *Systema Glossatorum*. *Fund og Forskning*, 4, 24–34.

- Linnaeus, Carolus, 1740: *Systema Naturae*, 2. ed., Stockholmiae.
- 1751: *Philosophia botanica*. Stockholmiae.
- Schuster, Julius, 1928: *Linné und Fabricius zu ihrem Leben und Werk*. München.
- Steffens, Henrich, 1842: *Was ich erlebte*. Breslau., Bd. III, 190–99.
- Tuxen, S. L., 1959: Der Entomologe J. C. Fabricius und die Typen der von ihm beschriebenen Arten. *Zool. Anz.*, **163**, 343–50.
- Zimsen, Ella, 1964: *The type material of J. C. Fabricius*. 656 pp., Copenhagen.