DIATOMS AS A MEANS FOR IDENTIFYING THE ORIGIN OF AQUATIC PLANTS

by

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In 1934 Dr van Steenis recorded *Elisma natans* (L.) Buch. for the first time outside Europe, viz. from Java. This unusual record was based on a single specimen collected in 1932 by Dr A. Kleinhoonte in Central Java at 2000 m altitude on Mt Diëng, now preserved in the Herbarium Bogoriense. Miss Kleinhoonte assumed there was little doubt that she had collected it in Java. After having collected information from the Fisheries Department in Java, that no *Elisma* was ever planted by that Service, Dr van Steenis stated (1, p. 175): "Though it is a waterplant, I cannot account for this enormous discontinuity." A year later (2, p. 55) he gave a figure of the specimen and concluded that he felt forced to accept the species as a native of Java.

However, he nursed a feeling that there was something wrong in this forced assumption. The pools on Mt Diëng are easy to reach and have been subjected to repeated botanical field work by experienced botanists onwards of Junghuhn. His doubt was later still strengthened by the fact that shortly before the war, the late Mr J. G. T. Loogen, a planter and enthusiastic amateur-botanist living N. of Mt Diëng, repeatedly searched the spot where *Elisma* was said to be found but without success.

In 1953 Dr van Steenis readily accepted an ingenious suggestion by Prof. J. Heimans, Director of the Hugo de Vries Laboratory, Amsterdam, to the effect that a reliable argument pro or contra might still be found in the identity of microscopic algae and diatoms found as lasionts on the herbarium sheet.

In 1953 Dr Heimans searched the herbarium specimen, obtained through the courtesy of the Keeper of the Herbarium Bogoriense, for desmids and diatoms. He found only the latter (*Gomphonema* spec.) and entrusted me with the microscopic preparation.

The result of my identifications, consisting of 6 species and 2 varieties observed, has been tabulated below.

Of *Cymbella affinis* and *Synedra ulna* var. *danica* only one individual could be traced; the other taxa were found in greater quantity, specially the *Gomphonema* species.

All species are cosmopolitan, but are frequently not found together, specially not in the tropics. This appears from the tabulated record

derived from data by F. Hustedt in his publications: "Systematische und ökologische Untersuchungen über die Diatomeenflora von Java, Bali und Sumatra" (1938) and „Süsswasserdiatomeen des Indo-Malayischen Archipels und der Hawaii Inseln" (1942), and as regards Porto Rico from the paper by R. Hagelstein "Diatomaceae of Porto Rico and the Virgin Islands" (1939).

Tabulated distribution of the *Elisma* diatoms

	Malaysia			Philippines				Hawaii		
Names of diatoms:	Java	Sumatra	Celebes	Mindanao	Jolo	Leyte	Luzon	Oahu	Kauai	Porto-Rico
Cymbella affinis Kütz.	c	+	+	—	—	+	+	—	—	c
Eunotia lunaris (Ehr.) Grun	c	+	+	+	—	+	+	—	—	c
Gomphonema acuminatum Ehr.	+	—	—	—	—	—	+	+	—	—
G. acum. var. coronata (Ehr.) W. Sm.	—	—	—	—	—	—	—	—	—	—
G. constrictum Ehr.	—	rr	—	—	—	—	--	r	—	c
G. parvulum Kütz.	+	+	c	+	+	—	c	c	c	cc
Synedra ulna (Nitzsch) Ehr. var. danica (Kütz.) Grun	+x	rr	c	—	+	cc	cc	+	—	—
Tabellaria flocculosa (Roth) Kütz.	r	rr	+	+	—	—	c	c	c	—

x First recorded in 1942.
cc Everywhere very common.
c Everywhere distributed.
\+ Locally occurring.
r Rarely found.
rr Only once found.
— Apparently absent.

Neither in Malaysia, nor in the Philippines, Hawaii and Porto Rico, all situated in the tropics at similar latitudes, do the species tabulated occur together, though the authors of the publications mentioned above, have examined samples from a fair number of localities. Hustedt examined also samples from Mt Diëng in about the locality where *Elisma* was said to have been collected.

Cymbella affinis is a common species in the tropics. *Eunotia lunaris* and *Gomphonema acuminatum* are rare in West and Central Java. *G. acuminatum* var. *coronata*, however, has never been recorded from the tropics, *G. constrictum* has never been recorded from Java and only once from Sumatra (Hustedt 1938). *Synedra ulna* is a widely spread species, recorded from Java and rarely occurring in Sumatra. *Tabellaria flocculosa* is an exclusive-halophobous species, occurring preferably in oligotrophous, humous water, p_H 4.5—7.5. It is common in Hawaii and Luzon, and has been found locally common in some places in Java.

Gomphonema acuminatum and its variety *coronata* and *G. constrictum* are common in Europe and occur in the Netherlands togteher with *Tabellaria flocculosa*, e. g. in the Kromme Waay, a pool near Heumen on the Meuse and in Het Hol, a boggy pool near Kortenhoef. Mayer records this combination for the Danube near Dillingen (1915) and Kolbe found it in the freshwater part of the oligo- to mesohaline Notte canal, a biotope where *Tabellaria* does not properly belong, but still occurred sparsely together with the three *Gomphonemas*.

Though it is not impossible, that in further examination of Malaysian waters the said species-combination might be found, I assume there is little chance after the meticulous researches by Hustedt in Java and Sumatra.

My conclusion is that through the combination *Tabellaria flocculosa*, which is rare in Java, with 3 *Gomphonemas*, of which one is rare and local and the other two have not been recorded from Java, it is most improbable that the *Elisma* specimen came from Java. Its origin was almost certainly Europe, more in particular the Netherlands.

The confusion is quite possibly due to the fact that, as Dr van Steenis told me, Miss Kleinhoonte dried her plants between used, grey, rough blotting sheets brought from Holland, to the underside of which a thin waterplant like *Elisma* might have by chance adhered and escaped attention, until the collection was in course of drying or properly examined for numbering or specific naming.

[1]) Bull. Jard. Bot. Buitenz. III, 13: 174—175, 1934.
[2]) De Trop. Natuur 34: 54—56, 1935.