

***Plusia tutti* Kostrowicki and *Plusia chrysitis* L. (Lep., Noctuidae)**

by

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In 1961 the Polish author A. S. KOSTROWICKI published an important monograph on the palaearctic *Plusiinae* in which he described a new species, strongly resembling *Plusia chrysitis*, and which he named *Plusia tutti* in honour of the famous British lepidopterist J. W. TUTT.

According to this author the new species is distinguishable from *chrysitis* by (a) smaller size, (b) the two coppery bands of the fore wings being broadly connected and (c) differences in genitalia. Only the genital armatures are figured (♂, fig. 48, ♀, fig. 115), not the moths themselves.

KOSTROWICKI says that *tutti* replaces *chrysitis* completely in Asia, with the exception of Persia and Asia Minor where both species occur. In eastern Europe *tutti* occurs together with *chrysitis*, outnumbering the latter, but the more one goes to the west, the more numerous *chrysitis* becomes. In his distribution map (fig. 10, p. 396) KOSTROWICKI shows approximately equal numbers for both species in the northwestern part of the continent, including the Netherlands.

When I read this article in 1964, it goes without saying that I was strongly interested in the question. As soon as I could find time I made two slides of males which according to their appearance should represent the two species. Their genitalia agreed excellently with the figures given by KOSTROWICKI. As will be

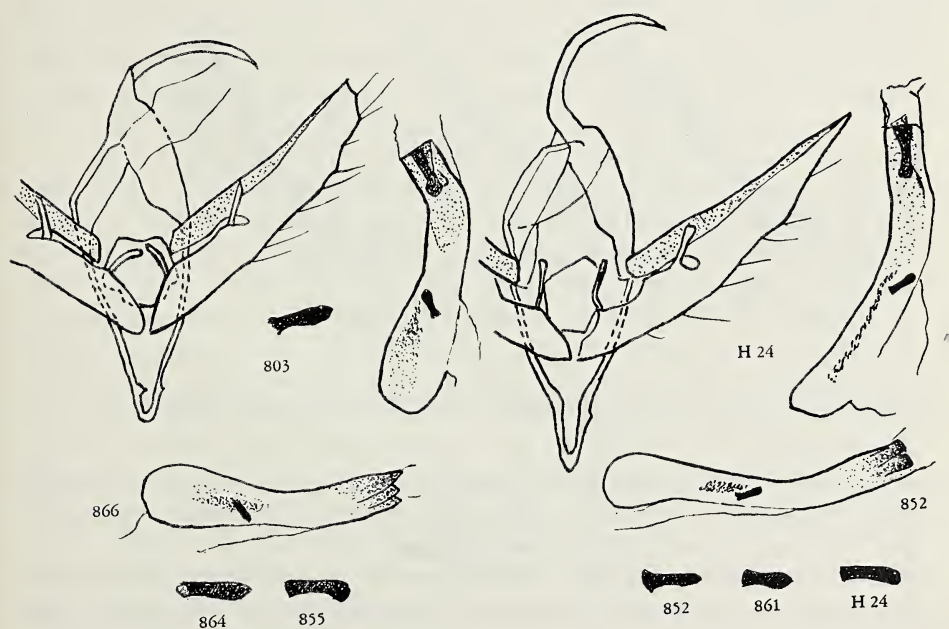


Fig. 1. Male genitalia (and cornuti separately) of *Plusia tutti* Kostrowicki (left) and *Plusia chrysitis* L. (right);  $\times 11$  (cornuti  $\times 38$ ).

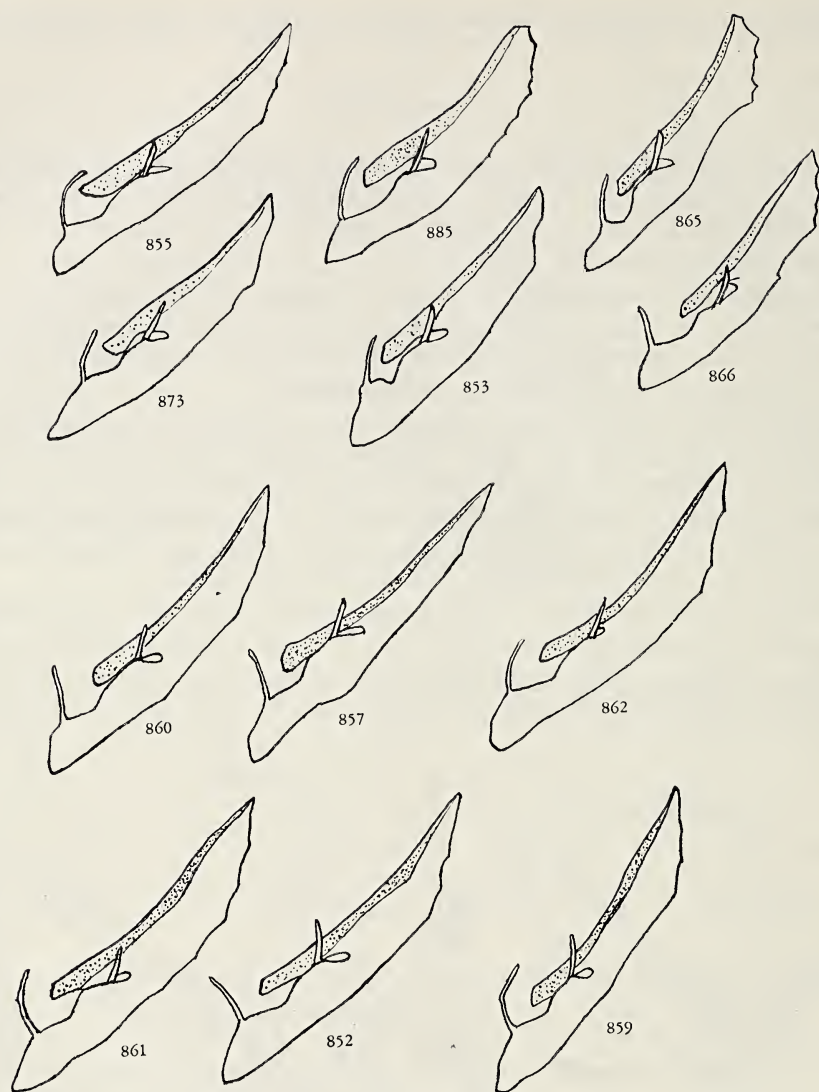


Fig. 2. Right valves of *Plusia tutti* (upper six) and *Plusia chrysitis* (lower six);  $\times 11$ .

seen in fig. 1, drawn from Dutch specimens, the valves of *chrysitis* are strongly tapered, but those of *tutti* are of equal width over their entire length, whereas the distal outer edge is much more dentated than in *chrysitis*.

However, when I had made a rather large series of preparations of male genitalia (about 30), it became clear that the shape of the valves is variable in both species. I have figured a series of them (fig. 2; all drawn after Dutch males), which shows that those of *chrysitis* may be as broad as a typical *tutti* valve (slide 861), whereas those of *tutti* may be rather pointed (slide 855) or narrow (slide

865). In both *tutti* and *chrysitis* I came across specimens in which the left valve was differently shaped from the right one! But the series figured shows that the valves of *tutti* are always smaller than those of *chrysitis*. This difference of size applies to the whole armature, as may clearly be seen from fig. 1. It is, however, not always easy to see this difference in a preparation without making a scale drawing.

KOSTROWICKI says that the cornutus of *tutti* is shorter than that of *chrysitis* and differently shaped, without stating in what way, as he does not describe the cornutus of *chrysitis*. In my experience it is not possible to separate the two species by means of this character. The cornutus is short and may lay in different positions in the penis, and the shape varies according to the angle of view. I have drawn some cornuti of both species in fig. 1, showing that the one of *chrysitis* may look much shorter than that of *tutti*. Sometimes no trace of the cornutus is to be found in quite undamaged specimens. I think that PIERCE had such a specimen, as, in describing the male armature of *chrysitis* (1909, p. 77), he did not mention the presence of a cornutus. His figure (plate XXIX) shows a typical *chrysitis* armature.

KOSTROWICKI states that the difference in the female armatures is less distinct than in that of the males. In this respect I quite disagree with him. As fig. 3 shows, it is especially the female that demonstrates the specific status of *tutti*. The ostium is much larger than that of *chrysitis*, showing some linear chitinous ridges, whereas the ostium of the latter is distinctly smaller and shows much broader leaf-shaped chitinous plates. The latter character proves that both female armatures figured by KOSTROWICKI (figs. 114 and 115) are those of *tutti*. The place where the ductus enters the bursa is in both species quite different and the bursa itself is smaller in *tutti* and more elliptical than in *chrysitis*. (K.'s fig. 114, which according to the text should be *chrysitis*, is still smaller than fig. 115, a paratype of *tutti*!). The female armature, figured by PIERCE (1942, and reprint, 1952, plate XIII), is very distinctly that of *tutti*, not of *chrysitis*.

It is as a rule not difficult to separate the two species by size, as may be seen from plate 1. However especially in the first generation genuine *tutti* specimens may occur, which are distinctly larger than they should be according to the original description. As *chrysitis* may produce specimens which are rather small, it is sometimes impossible to determine such specimens without making a preparation. One need only compare the two specimens figured in nr. 17 and 19. The width of the junction between the two coppery bands is also of little use as a differentiating character because they are not always broadly connected in *tutti*, as KOSTROWICKI writes. They may be narrowly connected (plate 1, fig. 13), or even completely separated in that species. Such specimens may be indicated as f. *disjuncta* nov., independant of the colour of the bands, which is as variable as in *chrysitis*.

Holotype: ♂, Uithuizen (Groningen prov.), 5.IX.1964, in the collection of the Amsterdam Zoological Museum. Fig.: plate 1, fig. 12; also fig. 10, 11, 16.

In the Netherlands both species are distributed over the whole country without any preference for a certain biotope. The Amsterdam Museum, which houses the richest collection of Dutch Macrolepidoptera, possesses at present a series of 191 *tutti* and 192 *chrysitis*. And in practically every Dutch private collection which I checked I found representatives of both species. It struck me, however, that almost



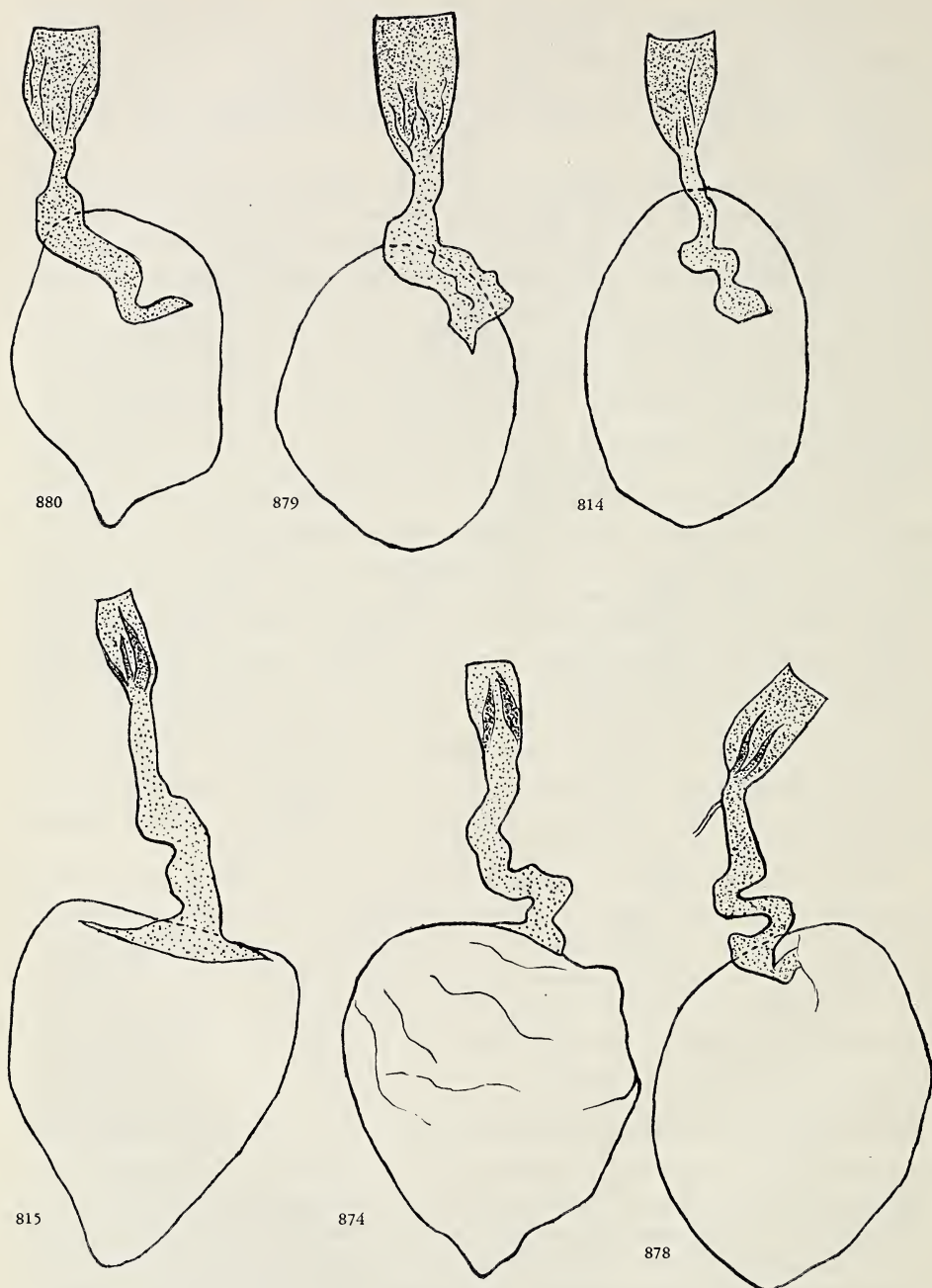


Fig. 3. Female genitalia of *Plusia tutti* (upper three) and *Plusia chrysitis* (lower three);  
× 11.





all specimens of *tutti* in these collections belong to the second generation (end of July to well into September or even October). I must confess that this made me doubt whether *tutti* would be a good species, but then I had not sufficiently studied the genitalia! In 1964, however, I asked Mr. W. J. BOER LEFFER, lepidopterist of the "Rivon" (State Institute for Nature Conservation Research) to preserve all "*chrysitis*" specimens that came into the traps of this Institute which were placed in different parts of the country. This extensive material also contained of course *tutti* specimens of the first generation.

My data are not yet sufficient to give histograms of the two species, but I strongly suspect that the result will be quite different for each of them. Whereas genuine *Pl. chrysitis* is much scarcer in the second generation than in the first, it seems that in *Pl. tutti* the reverse is the case. Its second generation is at any rate quite common. Otherwise the biology of the two species is identical. Both overwinter as a young caterpillar. In the spring of 1964, when raking my herbaceous border, a small green caterpillar which I did not know, fell on the ground. I fed it with dandelion and in May it duly produced a *tutti*!

My first date for both species is May 15. In the autumn of 1964 Mr. B. VAN AARTSEN caught a ♀ of *Pl. tutti* which laid a number of eggs. Some of the caterpillars fed very rapidly and produced moths in the course of November. One of them is figured on plate 1, fig. 13. This exceptional generation cannot occur in nature in our climate.

When one has a long series at one's disposal (as the one in the Amsterdam Museum) a distinct difference in markings shows up between *tutti* and *chrysitis*. In the former the majority has the two coppery bands united, in the latter the majority has them separated.

One might ask if KOSTROWICKI was justified to restrict LINNAEUS's name to the large species. The original description of *chrysitis* reads: "*P. Noctua spirilinguis cristata, alis deflexis: superioribus orichalceis fascia grisea*" (1758, p. 513). This clearly means that the two coppery bands were separated in the specimen described. LINNAEUS cites the Fauna Svecica, first edition, so that the Swedish form is the nominate form. As the large species does occur in Sweden, as is proved by the figure given by NORDSTRÖM & WAHLGREN (1940, pl. 31, fig. 3), KOSTROWICKI was fully justified in restricting the name *chrysitis* to the large species.

As regards the distribution outside the Netherlands I can only add a few data, as apart from the splendid collection of Mr. J. R. CARON, Hilversum, the Dutch collections contain only a very restricted material of palaearctic "*Heterocera*". I

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Fig. 1—4, 19. *Plusia chrysitis* L. 1. ♂, Putten; 2. ♀, Hollandse Rading (prep. 815); 3. ♂, Burgh; 4. ♀, Velsen; 19. ♂, Overveen (prep. 860). Fig. 5—18. *Plusia tutti* Kostrowicki. 5. ♂, Woerden (prep. 803); 6. ♂, Bussum (prep. 873); 7. ♀, Amsterdam (prep. 814); 8. ♂, Zwolle; 9. ♂, Oosterbeek; 10. ♂, Apeldoorn, f. *disjuncta* nov.; 11. ♂, Hollandse Rading, f. *disjuncta* nov.; 12. ♂, Uithuizen, f. *disjuncta* nov. (holotype); 13. ♂, Halfweg, 4.XI.1964, a. o.; 14. ♂, Azuga (Roumania); 15. ♂, Lugano (Switzerland); 16. ♂, Dürnstein (Lower Austria), f. *disjuncta* nov.; 17. ♂, Halfweg (prep. 885); 18. ♂, Tring (England, Herts.).

(The localities without further indication are Dutch ones).



saw specimens of *Plusia tutti* from the following localities: Finland: Lammi; Roumania: Azuga; Yugo-Slavia: Begunje; Austria: Dürnstein (Lower Austria), Vienna, Griffen (Carinthia); Switzerland: Lugano, Tesserete (both in Tessin); Great-Britain: Tring (Herts.), a specimen, which Mr. A. L. GOODSON kindly sent me for comparison.

The collection of the Amsterdam Zoological Museum contains a specimen of *Plusia chrysitis* which bears the following data: Asia centr. / Kuku Noor / leg. [W.] Rückbeil / coll. Tancre / ♂ — 1912. (Kuku Noor = Koko Nor, now called Ching Hai, a lake in Tsinghai, China).

If the label is genuine (and I do not see why such a common species should be sold with a false label), the range of *chrysitis* extends much more eastward into Asia than KOSTROWICKI thought.

#### PLUSIA TUTTI KOSTROWICKI EN PLUSIA CHRYSITIS L.

De Poolse auteur A. S. KOSTROWICKI beschreef in 1961 in zijn monografie over de palaearctische Plusiinae een nieuwe soort, nauw verwant aan *Plusia chrysitis* L., die hij *Plusia tutti* noemde. Het enige uiterlijke kenmerk, waardoor deze soort van *chrysitis* is te onderscheiden, is zijn geringere grootte. Volgens de auteur zijn bij *tutti* de twee koperkleurige banden op de voorvleugels altijd zeer breed met elkaar verbonden, maar de op plaat 1 afgebeelde exemplaren bewijzen, dat dit kenmerk lang niet altijd opgaat. Zelfs kunnen bij *tutti* de twee banden geheel van elkaar gescheiden zijn, net als bij typische exemplaren van *chrysitis* (f. *disjuncta* nov., plaat 1, fig. 10, 11, 12, 16). Dat we toch zonder enige twijfel met twee goede soorten te doen hebben, blijkt uit de verschillen in de genitaliën, die vooral bij de wijfjes duidelijk zijn. Voor bijzonderheden moge naar de Engelse tekst verwezen worden.

De nieuwe soort is evenals *Pl. chrysitis* over het gehele land verbreid en is zeker even gewoon. Geen van beide is aan een bepaald biotoop gebonden. Beide hebben twee generaties, die van half mei tot in oktober kunnen voorkomen. Het is echter vrijwel zeker, dat het voorkomen van deze generaties bij de twee soorten belangrijk verschilt. De gegevens, die op het ogenblik ter beschikking staan, wijzen erop, dat de tweede generatie van *tutti* veel gewoner is dan die van *chrysitis*.

Ik zou het bijzonder op prijs stellen, als de verzamelaars in het komende en mogelijk nog in het volgende seizoen extra aandacht aan deze twee soorten wilden besteden en nauwkeurig wilden noteren, op welke data en in hoeveel exemplaren ze de dieren gezien hebben. Dan kan te zijner tijd in de Catalogus een histogram gegeven worden, indien er inderdaad duidelijke verschillen blijken te bestaan. Uiteraard horen daar ook de gegevens van de reeds in de collecties aanwezige exemplaren bij. De meeste zijn met behulp van de plaat wel te determineren. Ik ben natuurlijk bereid in twijfelgevallen te assisteren.

De verschillen in de aan de imagines voorafgaande stadia, die zeer waarschijnlijk ook zullen bestaan (al was het maar in grootte) zijn nog onbekend. In elk geval overwinteren beide soorten als kleine rups.



## Bibliography — Geciteerde literatuur

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- LINNAEUS, C., 1758, *Systema Naturae*, ed. X: 513.
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- , 1942 (and reprint 1952), The Genitalia of the Group Noctuidae etc., an account of the morphology of the female reproductory organs. Oundle (Northants) and (reprint) Feltham (Middlesex).
- Amsterdam-Z. 2, Oude IJselstraat 12III.

Honderd jaar Mendel. Uitgaande van de Biologische Raad der Koninklijke Nederlandse Akademie van Wetenschappen zal dinsdag 20 en woensdag 21 april 's morgens en 's middags een symposium over de ontwikkeling van de erfelijkheidsleer van 1865 tot 1965 gehouden worden te Amsterdam in het Kon. Inst. voor de Tropen, Mauritskade 63.

Aan het deelnemen aan dit symposium zijn geen kosten verbonden. Het is echter noodzakelijk zich voor deelneming aan te melden bij het bureau van de Biologische Raad, Kloveniersburgwal 29, Amsterdam, waar ook nadere inlichtingen omtrent deze bijeenkomst verkregen kunnen worden.

Excursies van de Arbeitsgemeinschaft rheinischer Koleopterologen. 1. Mai, Hinsbeck, Ndrh. Treffpunkt ist der Domplatz Hinsbeck, Abmarsch von dort gegen 10.00 Uhr, wichtige Verkehrsverbindungen werden abgewartet.

12.—13. Juni, Mehrtagesexkursion nach Eschweiler bei Müstereifel. Treffpunkt ist Gaststätte Kurth, Hauptstraße, am 12.VI. morgens 10.00 Uhr sowie abends 18.00 Uhr.

Quartiere für diese Exkursion in Hotel Strick, Hauptstraße, Tel. Müstereifel 100, oder Privatquartiere vermittelt durch Gaststätte Kurth, Hauptstraße, Tel. Müstereifel 105.

Die Anmeldungen sind in beiden Häusern 4 Wochen vor der Exkursion erwünscht und ratsam.

Aanmeldingen voor deelneming aan ondergetekende:

W. HELLINGA, Weesperzijde 23 II, Amsterdam-O.

Op leven en dood. Problemen rondom de chemische en biologische bestrijding van plagen. Uitg. Centrum voor Landbouwpublicaties en Landbouwdocumentatie, Wageningen, 1964, 208 pagina's. Prijs f. 5,70.

Op 31 maart en 1 april 1964 werd te Amsterdam een symposium georganiseerd door de Biologische Raad van de Kon. Nederl. Akademie van Wetenschappen, getiteld „Op leven en dood”, dat als onderwerp had de problemen rondom de chemische en biologische bestrijding van plagen. De meesten van ons hebben slechts door onvolledige kranteverslagen kennis kunnen nemen van hetgeen op deze bijeenkomst werd behandeld. Zij kunnen door lezing van het hierbij aangekondigde boek een veel beter overzicht krijgen van de vele belangwekkende onderwerpen, die in die twee dagen door een aantal deskundigen werden besproken. Dit waren: 1. Dr. D. DRESDEN, Moderne ontwikkelingen op het gebied van de chemische bestrijdingsmiddelen; 2. Dr. N. VAN TIEL, Bestrijdingsmiddelen en de chemische industrie; 3. Prof. Dr. R. VAN DER VEEN, Schimmel- en onkruidbestrijdingsmiddelen; 4. Prof. H. VAN GENDEREN, Bestrijdingsmiddelen en volksgezondheid; 5. Prof. Dr. D. J. KUENEN, De verarming van flora en fauna; 6. Dr. F. J. VAN OPPENOORTH, Resistentie van insecten tegen insecticiden; 7. Dr. H. J. DE FLUITER, De harmonische bestrijding van plagen; 8. Ir. P. GRUYS, Biologische bestrijdingsmethoden en hun toepassing in Nederland; 9. Prof. Dr. J.