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## Some remarks on the systematics and nomenclature of the Acari

The Organizing Committee has requested me to give a short lecture to-day as an introduction to our discussions in this section on systematics.

I have agreed to do so, but I realize that it is difficult to summarize the present situation of systematics in a few words.

Our symposium is officially a European symposium on mites in general, but since our first meeting in Wageningen, The Netherlands, in 1956, the accent has been laying mostly on such mites which are of economic importance. In this fifth meeting this will also be the case, and so our programme of these three days will be mainly directed to the various aspects of the studies on agricultural and stored products acari.

This general introduction allows me, however, to dedicate also some words to other groups of acari which will not be the typical subjects of our coming discussions.

Every year a great number of new genera and species are described and numerous papers are published. The number of publications on the systematics and biology of Acari may at present be estimated to be around 1000 a year, without counting so many others dealing with applied or experimental research. This means that present workers are no more in a position to see, and certainly not to read the multitude of papers which appear on acarology, either whether they are systematic or applied workers.

This situation forces students to limit themselves to some defined groups. The advantage may be that they get a very good and perhaps unique knowledge of this group, but the disadvantage is that they lack the experience with problems of other mite species and that often the number of colleagues, able to discuss the details of the problems, becomes very limited.

Another difficulty is that we are continuously struggling with descriptions of old, badly known species, of which the types are no more available. Often, such species may even prove to form a complex, as their inconspicuous differential characters were not observed or not well interpreted. Nevertheless their names remain fully valid according to the International Code of Zoological Nomenclature. When looking through the literature we find repeatedly that even modern scientists with a great experience may differ entirely in the conception of a certain old species. This leads to many more papers to write and to read, and to confusion which, after all, has not become less after such papers have been published.

It may be recommended, therefore, to be very careful when reintroducing old, forgotten names, and to consider every time, and as much as possible, whether such an old name will disturb stability beyond measure. If so, it will be preferable to apply to the International Commission on Zoological Nomenclature for a decision.

If there are some specialists working on the same genera or species, it may be recommendable that in complicated cases they have a preliminary contact before a decision is published. If this contact leads to their mutual agreement, additional papers to explain other ideas can be avoided.

The possibility offered by the International Code to establish neotypes may make it easier to come to a definite decision, but the strict rules existing for the validity of such a neotype may be a handicap. On the other hand it must be said that without such strict rules the system of neotypes would not be satisfying at all, and would even be a dangerous one. Another possibility consists of the designation of lectotypes in the case of complexed species.

The confusion about old species, and the necessity of establishing neotypes if the types are lost, are greatest in the old world, where so very many species have been published with far too short descriptions and often with bad or incorrect drawings. In other parts of the world, far away from Europe, the chance that a species is really new and not one of the badly known species, is much greater.

The rules of the Code also offer the possibility to put important problems before the International Commission on Zoological Nomenclature, so that she can use her plenary powers, but the difficulties for this Commission, such as the contact between her international members and the necessity sometimes to make a detailed study of

the problem in question, are often so great that a decision may take a long time, sometimes even more than a year.

After so many years the registration of the world's mite species — taken as a whole — is still very incomplete. The number of species still undescribed will appear to be enormous, especially also when the tropical or remote areas will be investigated more intensively than has been possible up to now.

Another problem is how to arrange the species in suitable genera and subgenera. Much more even than establishing a new species, the genus designation is a question of the subjective ideas of its author. What should we do? Should we make a great number of genera with few species (and such genera will often be monobasic), or few genera with many species? A strict rule cannot be given. But if we decide to limit the number of genera as much as possible, shall we then restrict ourselves by establishing species groups, or shall we establish subgenera?

In my personal opinion establishing a great number of subgenera may appear attractive from the point of view of pure systematics. On the other hand, however, it means more names to keep in mind, and often double names to be written in publications. Another point is that the subjective way of grouping species in genera and subgenera often causes a difference of opinion between different authors, with as a result new grouping and new names. We must not forget that in many cases, with our present limited knowledge of the phylogeny and the evolution of the mites, we cannot estimate exactly the relationships and that what we are doing is often not more than a groping in this extremely complicated matter. Therefore it is often recommended to give preference to a simple, artificial grouping.

In acarology it would be nice to reject a number of the old species, in order to open the possibility for entirely new names and descriptions. This, however, should be made with care and in consult with the International Commission who can place such names on the Official Index of Rejected and Invalid Names in Zoology.

During the last (XIIth) International Congress of Entomology in London, 1964, where rather many acarologists were present, though only part of the participants of our symposium, we had the possibility for a short discussion. Dr. G. OWEN EVANS from London gave a very interesting review of the difficulties, especially with regard to the *Phytoseiidae*. The number of species described in this family has grown very much and more and more species are added every year. This has

lead to establishing a great number of genera, choosing various characters to group the species. It is, however, a fact that one hardly knows which characters to choose for this purpose. The idea of a genus is that it makes a natural grouping of a number of species which are related according to the development of evolution. However, do we know which characters are the correct ones for this purpose? In my opinion: no! When we restrict ourselves for this moment to the *Phytoseiidae*, we find that grouping may be made in different ways. When we sort out a number of species which together show a certain character or certain characters, it may be that some other species are excluded which nevertheless seem to be closely related and do not fit in one of the other existing genera. The result will be a new genus (or perhaps a new subgenus), added again for these species to the existing ones. The risk is that a later specialist will not agree and will make another grouping based on other characters, with some names disappearing in synonymy (yet still valid and their names to be kept in mind), and a number of new names added to those existing already.

Dr. EVANS asked his auditorium for their ideas about the question and I remember that in the discussion I have underlined the problems explained by him and that I myself, from my personal point of view, have defended to avoid in general establishing a great number of small genera, as long as we have still such a limited knowledge about the reality of evolution and natural relationships.

What I have observed here with regard to the *Phytoseiidae*, applies also, of course, to various other mite families rich in species, where we struggle with the same problem.

When I have been talking here about different problems of systematics, it has certainly not been my idea to give the impression that I myself always know exactly what to do. The only idea of the general part of this short lecture was to put some of the problems before you, so that we together can realize them and — as I hope — can have a fruitful discussion to-day after I shall have finished.

I shall now give some remarks on systematical subjects and on papers published during the last few years. I have had to make a choice. Too many papers have been written to mention them all and so, much to my regret, a great number of valuable publications will have to remain undiscussed. Many of them, however, can be found in MARC ANDRÉ's periodical « *Acarologia* », and, of course, in the references given by the *Zoological Record*.

In general respect a fourth printing (1964) has appeared of the well-known « An Introduction to Acarology » by BAKER and WHARTON (Macmillan, New York, 1964, 465 pp.).

Another general publication is « Advances in Acarology », vol. I, edited by John A. Naegele, Ithaca (N. York), 480 pp., 1963 (first printing) and 1964 (second printing). It is largely based on the symposium « Recent Advances in Acarology » held at Cornell University, Ithaca (New York), U.S.A., March 26-29, 1962.

September 2-7, 1963, the First International Congress on Acarology was held at Colorado State University, Fort Collins (Colorado), U.S.A. Some 130 participants were present, representing 23 countries. The Proceedings have been published in a special number (vol. 6, hors série, 439 pp.) of *Acarologia*, October 1964. The meeting was a great success and the Second International Congress will be held at Sutton Bonington, near Nottingham, England, 19th-25th July 1967.

#### MESOSTIGMATA

Much work has been done on the systematics of free living *Mesostigmata*. WERNER HIRSCHMANN is gradually publishing in the course of the years a series of works based on the « Gangsystematik ». The same principle is the basis of a large volume in the series « Beiträge zur Systematik und Ökologie mitteleuropäischer Acarina », written by FRITZ BERNHARD and IRMGARD WESTERBOER. The superfamily *Laelaptoidea* is established and the families *Ascaidae* Oudemans, *Podocinidae* Berlese, and *Phytoseiidae* Berlese, are described. The remaining families will be published later.

The idea of « Gangsystematik » is to try to find characters which remain constant throughout the whole life cycle. Such characters can be found in the hypostome, the epistome and the chelicerae. Further characters of great systematic value are found, for instance, in the hairs and the pores of the dorsum and the venter.

VAN DER HAMMEN, Leiden, has worked out a detailed study on the morphology of *Glypholaspis confusa* (Foà, 1900), thus discussing as a starting point one of the large free-living *Macrochelidae*.

EVANS published a study on the chaetotaxy of the legs in the free-living *Gamasina*.

## IXODOIDEA

A detailed study on the British Ixodoidea, at the same time discussing most of the European ticks, has been published by DON R. ARTHUR, 1963.

## TROMBIDIFORMES

*Tetranychidae*

In the genus *Tetranychus* the situation has not changed very much. The problem of the definitive scientific names of some of the commonest spider mites has not yet been settled. BOUDREAUX and DOSSE have proposed to use in future *Tetranychus telarius* (L., 1758) for the red species *T. cinnabarinus* (Boisduval, 1866) *sensu* Boudreux, 1956, *T. urticae* C. L. Koch, 1836 for the Common Red Spider Mite (formerly often called *T. telarius*), and *Eotetranychus tiliarium* (Joh. Hermann, 1804) for the Linden (Limetree) Red Spider Mite.

VAN EYNDHOVEN has defended to use *Eotetranychus telarius* (L., 1758) for the Linden Red Spider Mite, *T. urticae* as proposed by BOUDREAUX and DOSSE, and to maintain the name *T. cinnabarinus* Boisduval, 1866 as it has been interpreted by Boudreux in 1956.

The main reason for the objection of Van Eyndhoven was that the name *telarius* was already struggling many years with a confusion between two ideas and that the proposal of Boudreux and Dosse would create a third and new meaning for the name without a strict necessity, as a suitable one (*T. cinnabarinus*) was already well introduced and available.

The different opinions are now studied by the International Commission on Zoological Nomenclature and we are waiting for her decision.

*Tetranychus lintearius* Dufour, 1832, the type species of the genus, typical for the gorse, *Ulex europaeus*, has proved to be a good and valid species. A paper by VAN EYNDHOVEN is in the press. The most conspicuous differential characters are that tarsus II of the male has a similar empodium as tarsus I and that the pattern of the dorsal striae of the females is deviating from that of *T. urticae* C. L. Koch, 1836.

*Tetranychus urticae* C. L. Koch, 1836. When we are comparing the morphological characters of a number of different populations of this species, as they are reared by, for instance, Dr. W. HELLE in Amsterdam, we find that small differences can be seen, mostly with regard to dimensions. Even the aedeagus is not entirely uniform. It seems that such differences remain within the limits of the species. On the other

hand, there exist populations which do not fit well for crossing experiments. The difficulty is to find out whether such populations merit to be considered as separate species and where to find characters suitable for a morphological description.

The experience with *T. lintearius* may give some hope, but in the case of the *urticae*-complex the situation is extremely subtle.

Moreover little work has been done, so far, with original populations collected from weeds in the open field. The experiments mostly refer to mites from plant cultures, under artificial and forced conditions.

*Panonychus ulmi* (C. L. Koch, 1836). According to the International Code the genus name *Metatetranychus* has to be changed into the name *Panonychus* Yokoyama, 1929. *Panonychus* was originally considered by PRITCHARD and BAKER (1955) to be a synonym of *Oligonychus*, but investigations by EHARA (1956) have shown that it is a senior synonym of *Metatetranychus* Oudemans, 1936.

Three years ago we have been discussing whether there might be a reason to ask the International Commission to reject the name *Panonychus* and we have requested Dr. G. Owen Evans, London, to study the problem.

In the meantime the name *Panonychus* has been used in quite a number of publications and most other workers will know of its existence. The name does not raise large problems; it is a question of synonymy of a genus name and no new confusion can be expected when using it. The previous name *Paratetranychus pilosus* Can. & Fanz., 1876 for this mite also has disappeared easily.

My personal opinion is, therefore, not to ask for a decision of the International Commission, but to accept the name *Panonychus* for future use.

Dr. Evans has reached the same conclusion and we shall discuss his letter in the course of the day.

#### OTHER TETRANYCHIDS

As far as I know, little has changed, apart from new species having been described.

*Eotetranychus carpini* (Oudemans, 1905). So far, nobody has succeeded in discovering valuable morphological differences between *E. carpini* from *Carpinus* and *E. carpini* from *Vitis*. Yet transplantation from one host plant to another, and crossbreeding seem not to be well possible. ROTA and DOSSE have made various experiments. So we have still to wait for definitive conclusions.

### *Bryobia*

The names which I have applied for the traditional forms within the old *praetiosa*-complex have been accepted and have become well known now. Since then I have seen many other populations and the differential characters prove to be constant.

I will not say, however, that *Bryobia* has become an easy genus now. A number of species are parthenogenetic or their males are so few in number (*B. cristata* Dugès, 1834) that they do not influence the population. In such cases small deviations in the characters are difficult to interpret. For other species, where the males are a regular phenomenon, the situation is easier and the differential characters mostly are much better.

### *Eriophyidae*

The Eriophyid mites are studied by H. H. KEIFER of the California Department of Agriculture, Sacramento, in his long series of Eriophyid Studies. Although his recent papers mainly deal with American species, his genus diagnoses are of great importance also for the European fauna.

## EPIZOOTIC MITES

Many publications deal with the systematics of epizootic mites, especially the *Rhinonyssidae*, the *Speleognathidae* and the *Sarcoptiformes*. Gradually, the conditions for research growing better, more and more species are discovered. Partially the work is rather simple; often the mites are entirely new and show many attractive characters for a description. In such a case the main problem is how to arrange them in genera and families. One is amazed to see how curious many species are in their morphological characters. We find an enormous variation caused by the adaption of the mites to the conditions of the microbiotope offered by their host. It is sufficient to look through the publications of A. FAIN, M. M. J. LAVOPIERRE, and others to get an impression.

The situation is more difficult when a number of hosts, sometimes spread all over the world, accommodate very similar mites, morphologically more or less identical. An example is the Canary Mite, *Sternostoma tracheacolum* Lawr., 1948.

FAIN and HYLAND (1962) have made a detailed study of this species and they are of opinion that the mites they have found in the nose and the trachea of the domestic canary and several wild birds belong to one

and the same species. Yet, small deviating characters or variations can be seen. The question is: Is this a very variable species, or are these different species with constant characters defined by the occurrence on the typical host?

My own studies have shown that *Rhinonyssus rhinolethrum* (Trouessart, 1895) originally described from the domestic Goose and later mentioned from many other species of geese and ducks, is not one single species. *Rh. levinseni* (Trägårdh, 1907), described from the Eider, *Somateria mollissima* (L.), is an entirely other species than *Rh. rhinolethrum*. I published this result in 1964. There are certainly more species, but the studies have not yet been completed. At all events the differences in the characters are greater than acceptable for a slight variation caused by passing from one host to another by gregariousness of the birds.

Sometimes the forms of other hosts have been described as subspecies. In my opinion this is not correct. The idea of a subspecies in the modern sense and as it has been defined in the International Code, indicates that the exponents of a species may show conspicuous differences mostly caused by geographical circumstances, but that between those exponents a number of intermediate forms exist which in regions where they meet will make hybrids without any difficulty.

Nothing is known in this respect about these bird mites. It is only possible to see that there exist a number of well definable forms with distinct morphological characters, which are adapted to a certain host and which do not pass to another host except under accidental circumstances. If such accidental circumstances lead to a displacement, they maintain — as far as known — their own typical characters.

As up to now it is impossible to make successful experiments of transmission or crossbreeding, and as the different forms are living often in the same geographical region, they should be described as species.

A similar situation exists for the *Spinturnicidae* living on bats. Recently RUDNICK (1960) and DUSBÁBEK (1962) have published on these species and they have found that many *Spinturnix*-species are closely related, but that — roughly said — every bat species has its own *Spinturnix*-parasite with constant morphological characters. We also find that in mixed host populations every *Spinturnix*-species keeps to its own host bat.

I will not say that such a parasite would not be able to keep alive

on another host for a long time. This will perhaps be possible, but it does not influence the general rule of specialisation.

#### ACARIDIAE

The study of the *Acaridiae* also has become more and more important for applied acarology.

GRIFFITHS, Slough (England) has especially dealt with the genus *Acarus*. He has discovered that the old *Acarus siro* of Linnaeus, 1758 (= *Tyroglyphus farinae* L., 1758) is a complex species and has split it into three species: *Acarus siro* L., 1758 *sensu stricto*, *A. farris* (Oudemans, 1905) and *A. immobilis* Griffiths 1964. Apart from this complex there are some other species which have conspicuous differential characters.

When studying the *Acaridiae*, we find that the organisation of the female genitalia may be of great value for systematic purposes. In general sense it may be said that many genera can be well defined by a description of the genitalia. Nevertheless, if these characters are not sufficient to split genera now existing as a unit, it may occur that more than one type is represented within the limits of one genus. This is the case, for instance, in *Rhizoglyphus*.

The general differences can be observed in both males and females, and are an adaptation to the mode of copulation.

#### ORIBATEI

For a long time already the *Oribatei* have been a favourite subject for study, perhaps because most of them are rather large and in many cases offer good differential characters.

The founder of modern oribatology is Prof. F. GRANDJEAN in France and his chaetotaxy is followed now by all other specialists.

In order to find out the relationship between the families and genera, it is often necessary to possess all stages from larva to adultus.

#### S U M M A R Y

Some general aspects of the systematics and nomenclature of the Acari are discussed, such as the great number of papers published every year, the problem of badly known species, the contact between specialists, the International Code of Zoological Nomenclature, the grouping of genera and species.

Some additional notes are given with reference to recent publications on various groups, e.g. the *Mesostigmata*, the *Tetranychidae*, the epizootic mites, the *Eriophyidae*, the *Acaridiae*, and the *Oribatei*.

## R I A S S U N T O

Vengono discussi alcuni aspetti della sistematica e della nomenclatura degli Acari, quali il problema delle specie mal conosciute, il raggruppamento delle specie e dei generi, i contatti fra gli specialisti, il gran numero dei lavori pubblicati ogni anno e il Codice internazionale di Nomenclatura zoologica.

Vengono fornite alcune note aggiuntive con riferimento a recenti pubblicazioni su vari gruppi, quali i *Mesostigmata*, i *Tetranychidae*, gli Acari epizootici, gli *Eriophyidae*, gli *Acaridae* e gli *Oribatei*.

## S O M E R E F E R E N C E S

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## DISCUSSION

MATHYS: Pourquoi la commission de taxonomie met-elle tant de temps pour prendre une décision au sujet du problème créé par des divergences de vue entre MM. van Eyndhoven, Boudreaux, Dosse au sujet de la nomenclature: *Tetranychus urticae* - *T. telarius* - *T. cinnabarinus*?

VAN EYNDHOVEN: La perte de temps est due d'abord à la nécessité de publier les « Comments » dans le Bulletin of Zoological Nomenclature. Actuellement la Commission l'étudie et je pense que nous pouvons avoir bientôt sa décision définitive.

ROTA: Si è riusciti, mediante esperimenti di laboratorio basati sulla regolazione della temperatura e dell'umidità, a mutare l'ospite dell'*Eotetranychus carpini*, ossia a trasferire su Carpino la forma vivente sulla Vite e viceversa? Sono in corso incroci ♀ Vite  $\times$  ♂ Carpino? In natura è difficile osservare il passaggio dal Carpino alla Vite.

VAN EYNDHOVEN: Sous ces circonstances je préfère de ne pas encore user des noms subspécifiques (bienqu'ils existent déjà) en attendant les résultats des expérimentations supplémentaires.

MATHYS: Il faut avoir un commun langage pour les noms des acariens importants.

VAN EYNDHOVEN: Il y a plusieurs ans nous avons établi une liste des noms que nous recommandons pour ces acariens. Le mieux est de suivre cette liste autant que possible. *Metatetranychus* en tous cas devra être changé en *Panonychus*. Je vais tâcher de retrouver cette liste, afin qu'elle puisse être publiée encore une fois dans les Atti.

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## Fruit trees

- Panonychus ulmi* (C.L. Koch)
- Tetranychus urticae* C.L. Koch
- Bryobia rubrioculus* (Scheut)
- Bryobia graminum* (Schrank) *sensu* Gäbele
- Eotetranychus pomi* Sepasgosarian
- Eotetranychus pruni* (Oudemans)
- Tetranychus viennensis* Zacher  
(= *T. crataegi* Hirst)
- Cenopalpus pulcher* (Can. & Fanz.)
- Eriophyes pyri* (Pagst.)
- Aculus schlechtendali* (Nal.)
- Tarsonemoides pomi* Suski
- Calvolia transversostriata*  
(Oudemans)

Vine (*Vitis*)

- Panonychus ulmi* (C.L. Koch)
- Tetranychus urticae* C.L. Koch
- Eotetranychus carpini* (Oudemans)  
*f. vitis* Dosse
- Epitrimerus vitis* Nal.
- Phyllocoptes vitis* Nal.

Strawberry (*Fragaria*)

- Tetranychus urticae* C.L. Koch
- Tetranychus atlanticus* McGregor
- Steneotarsonemus fragariae* (Zimm.)  
[not. = *St. pallidus* (Banks)]

Blackberry (*Rubus* sp.)

- Aceria essigi* (Hassan)

Black currant (*Ribes nigrum*)

*Cecidophyes ribis* (Nal.)

Gooseberry (*Ribes uva-crispa*)

[= *grossularia*]

*Bryobia ribis* Thomas

Glasshouse crops

*Tetranychus urticae* C.L. Koch (grape, peach, rose, cucumber, pot plants)

*Tetranychus cinnabarinus* (Boisd.) [= *T. telarius* (L.) *sensu* Boudreux] [carnation (*Dianthus*) and pot plants] (\*)

*Brevipalpus inornatus* (Banks) (pot plants)

*Steneotarsonemus pallidus* (Banks) (*Cyclamen*, *Hedera* sp.)

*Hemitarsonemus latus* (Banks) (pot plants)

#### Predators

*Typhlodromus pyri* Scheutten

*Typhlodromus rhenanus* (Oudemans)

*Typhlodromus tiliarum* Oudemans

*Typhlodromus bakeri* (Garman)

*Typhlodromus potentillae* (Garman)

*Typhlodromus soleiger* (Ribaga)

*Typhlodromus longipilus* Nesbitt

*Amblyseius finlandicus* (Oudemans)

*Amblyseius aberrans* (Oudemans) [= *A. vitis* (Oudms.) = *Kampimodromus elongatus* (Oudemans)]

*Amblyseius cucumeris* (Oudemans)

*Amblyseius masseei* (Nesbitt)

*Amblyseius zweelferi* (Dosse)

*Phytoseiulus riegeri* Dosse

*Phytoseiulus macropilis* (Banks)

[= *Ph. spoofi* (Oudms.)]

*Zetzellia mali* (Ewing)

(\*) The definite name for this mite is now under consideration by the International Commission on Zoological Nomenclature.