

On the genus *Notoedres* Railliet, 1893, with a description of *Notoedres centrifera* n. sp. from the squirrel *Ratufa bicolor*

by

J. JANSEN JR.

Institute of Veterinary Parasitology and Parasitic Diseases of the State University, Utrecht, the Netherlands.

Since the comprehensive paper on the genus *Notoedres* by OUDEMANS (1926) giving a definition of the genus and descriptions of the four species then known only two species were added up to 1959, *Notoedres roesleri* by VITZTHUM (1932) and *Notoedres vanschäiki* by VAN EYNDHOVEN (1947). In 1959 FAIN (1959a, 1959c) gave an elaborate new definition of the genus *Notoedres*, stressing the importance of the morphology of the posterior apodemata in the male. At the same time FAIN (1959b, 1959c) added *N. chiropteralis* (Trouessart, 1896) of which *N. vanschäiki* appeared to be a synonym, and *N. myotis* (Hedeek, 1953) to the genus *Notoedres*, along with (1959c) eight new species.

Though the composition of the genus *Notoedres* appears very homogenous, there are also some peculiar morphological features which make a splitting into subgenera acceptable. FAIN (1959c) erected the subgenus *Metanotoedres* for notoedric mites with strong spines instead of setae on coxae III and IV and on trochanter III, with almost the whole of the dorsal surface covered by shields in the males, and with the apodemata I fairly well separated in the females. On the other hand it seems to me that the *Notoedres* spp. can be divided on the basis of the appearance of the dorsal surface and the presence of a pair of setae between the apodemata IV in the female. As already pointed out by OUDEMANS in 1915, cited and repeated by OUDEMANS (1926), the dorsal surface of *N. cati* and *N. musculi* is scaly, and the pair of setae between the apodemata IV is missing, whereas in the other *Notoedres* spp. the dorsal surface is striated to a certain extent and not scaly, and a pair of setae between the apodemata IV is present. So I propose, that the subgenus *Notoedres* retains *N. cati* (Hering, 1838) with its two varieties *cati* and *cuniculi* and *N. musculi* Oudemans, 1898 (*cuniculi* is a misspelling and may be emended in accordance with article 32 of the International Code of Zoological Nomenclature), and to erect the subgenus *Mesonotoedres* n. subg. to contain all other *Notoedres* spp. not belonging to the subgenus *Metanotoedres* FAIN, 1959.

Definition of the genus *Notoedres* Railliet, 1893 (adapted from FAIN (1959c)): With the characteristics of the Sarcoptidae. **M a l e** : apodemata IV fused with genital sternite medially; apodemata III forming a transversal sclerite connected with the genital sternite; caruncles on tarsi I, II, and (mostly) IV; on tarsus IV two sessile suckers. **F e m a l e** : caruncles on tarsi I and II; dorsal surface striated, with or without smooth zones or with a scaly area; six pairs of setae near the anus; anus dorsal near the posterior end of the body. Type-species: *Notoedres cati* (Hering, 1838).

Key to the genus *Notoedres* into subgenera.

1. Dorsal surface with a scaly area; pair of setae between apodemata IV missing in the female subgenus *Notoedres* Railliet, 1893.
Dorsal surface striated with or without smooth zones; no scaly area; pair of setae between apodemata IV in the female. 2.
2. On coxae III and IV, and on trochanter III setae; not the whole dorsal surface covered by shields in the male. Apodemata I fused to an Y-shape in the female subgenus *Mesonotoedres* n. subg.
On coxae III and IV, and on trochanter III strong spines and the whole dorsal surface covered by shields in the male. Apodemata I fairly well separated in the female. subgenus *Metanotoedres* Fain, 1959.

Definition of the subgenus *Notoedres* Railliet, 1893: With the characteristics of the genus *Notoedres*. M a l e : setae on coxae III and IV, and on trochanter III; on the dorsal surface a scaly area may be present. F e m a l e : apodemata I fused to an Y-shape; no pair of setae between apodemata IV; dorsal surface with a scaly area.

Type-species: *Notoedres (Notoedres) cati* (Hering, 1838).

Definition of the subgenus *Mesonotoedres* n. subg.: With the characteristics of the genus *Notoedres*. M a l e : setae on coxae III and IV, and on trochanter III; not the whole dorsal surface covered by shields and no scaly area. F e m a l e : apodemata I fused to a Y-shape; pair of setae between apodemata IV; dorsal surface striated with or without smooth zones but no scaly area.

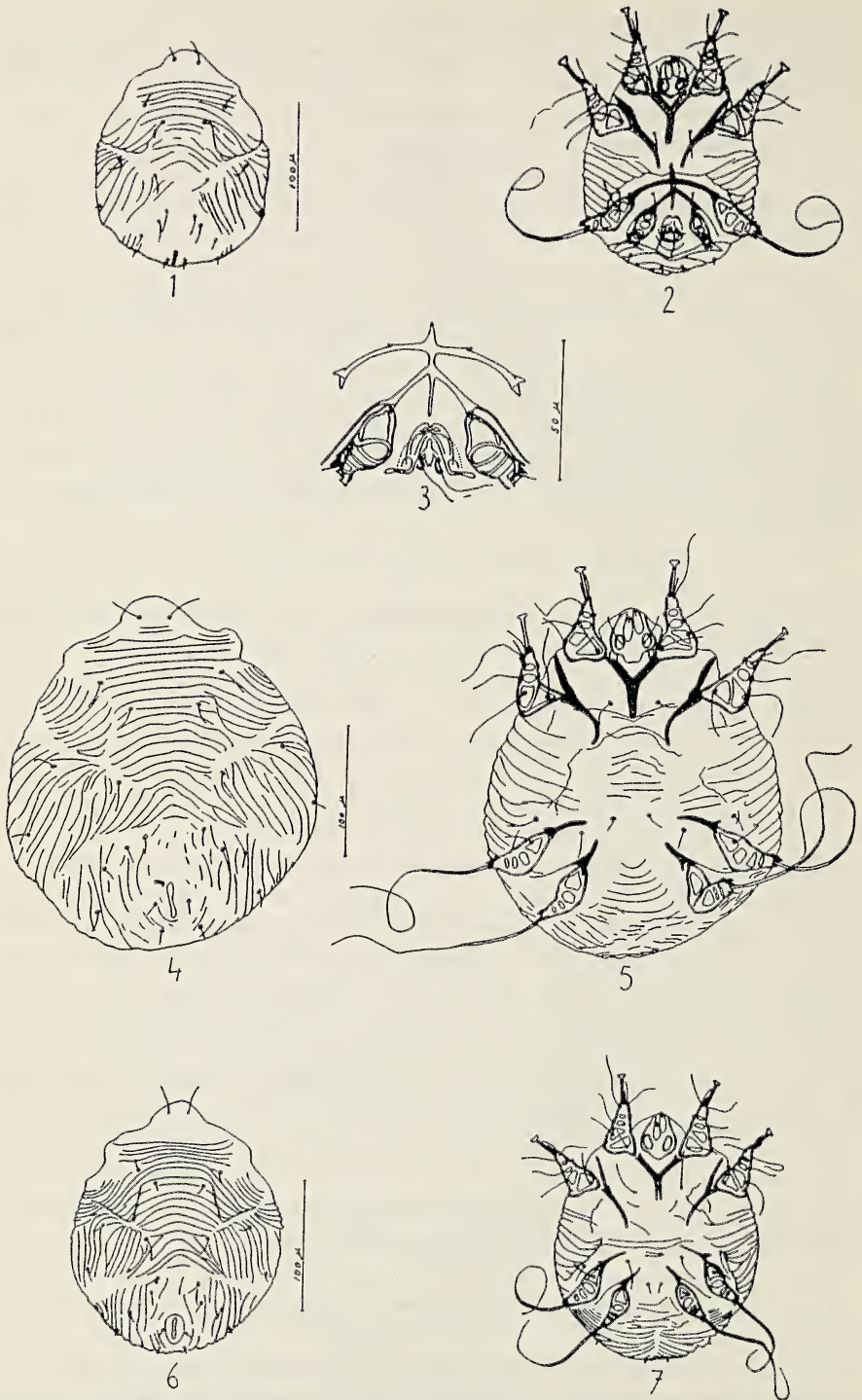
Type-species: *Notoedres (Mesonotoedres) notoedres* (Mégnin, 1877).

For a definition of the subgenus *Metanotoedres* Fain, 1959, and a key to the *Notoedres* spp. the reader is referred to FAIN (1959c).

The subgenus *Mesonotoedres* n. subg. has an intermediate position between the subgenera *Notoedres* and *Metanotoedres*. It has in common with *Notoedres* the setae on coxae III and IV, and on trochanter III in the male and the apodemata fused to a Y-shape in the female whereas it has in common with *Metanotoedres* the dorsal surface without scaly zones and the presence of a pair of setae between apodemata IV in the female. One may wonder if the suggestion of FAIN (1959c) is correct that *Notoedres notoedres* could be the ancestor of the *Notoedres* spp. in bats. It is rather uncommon to have the setae between apodemata IV missing in the female. One would imagine that only the *Notoedres* spp. with the longest history of parasitic existence have lost these setae. It is also thinkable that the appearance of scaly areas points in the same direction. But it is not appropriate to state whether *Notoedres cati* or *N. musculi* is an ancestor of *N. notoedres* or all descended from the same unknown, extinct species.

Description of *Notoedres centrifera* n. sp.

Material containing ♂ ♂, ♀ ♀, tritonymphs, protonymphs, larvae, and eggs of a *Notoedres* sp. was taken (9.XI.1962) from the skin of an Indonesian squirrel, *Ratufa bicolor*, which died in a private collection in the Netherlands; the



Figures 1—7. *Notoedres centrifera* n. sp. 1. dorsum of ♂, 2. ventral view of ♂, 3. apodema III and IV, legs IV, and genital armature of ♂, 4. dorsum of ♀, 5. ventral view of ♀, 6. dorsum of tritonymph, 7. ventral view of tritonymph.

post-mortem was conducted by F. G. POELMA (Institute of Tropical and Protozoan Diseases, Utrecht).

As the specimens are easily deformed, all measurements were done with the slightest possible pressure on the coverglasses.

Male (fig. 1, 2, 3).

Subglobular. Length (idiosoma and gnathosoma) 149—158 μ , breadth 105—117 μ .

Dorsal surface.

Striated except for a small area round the anus. There are about 14 striations from vertex to anus. On the vertex a pair of slender vertical setae. Length of scapular and humeral setae 16—20 μ . Distance between internal scapular setae 33—37 μ , external scapular setae 53—55 μ , internal humeral setae 43—47 μ , and external humeral setae 91—101 μ . Near the lateral margins of the hind body a small seta is present. The preanal and paraanal setae are short and bristly. The anterior two pairs of preanal setae are 13—16 μ in length, the posterior 8 μ , the paraanal setae 7 μ . Anus dorsal.

Ventral surface.

Striated between legs II and III and on the posterior margin of the body. Normal gnathosoma. Pairs of setae on gnathosoma, trochanters I and II, between apodemata I and II, on coxae III and IV, trochanter III, and on the genital armature. Some of the preanal and paraanal setae are sometimes to be seen on the ventral side. The apodemata I fused to an Y-shape, the stem being almost wholly split, but it seems that the real form is a small gutter. Apodemata II normal. Apodemata III forming a transverse sclerite fused with a long genital sternite as are the apodemata IV, which are provided with long spurs laterally. Genital apparatus normal. The chaetotaxy of the legs is as figured and the same as in other *Notoedres* spp. It should be noted, that the setae on femora I and II are not located on the lateral margin but on the ventral side. The species under consideration has this feature in common with *Notoedres notoedres*. A very peculiar feature is the lack of caruncles on pedicels on legs IV. This is not an anomaly as proved by the fact that all males (several tens) lack these caruncles in addition to the two sessile suckers on leg IV.

Female (fig. 4, 5).

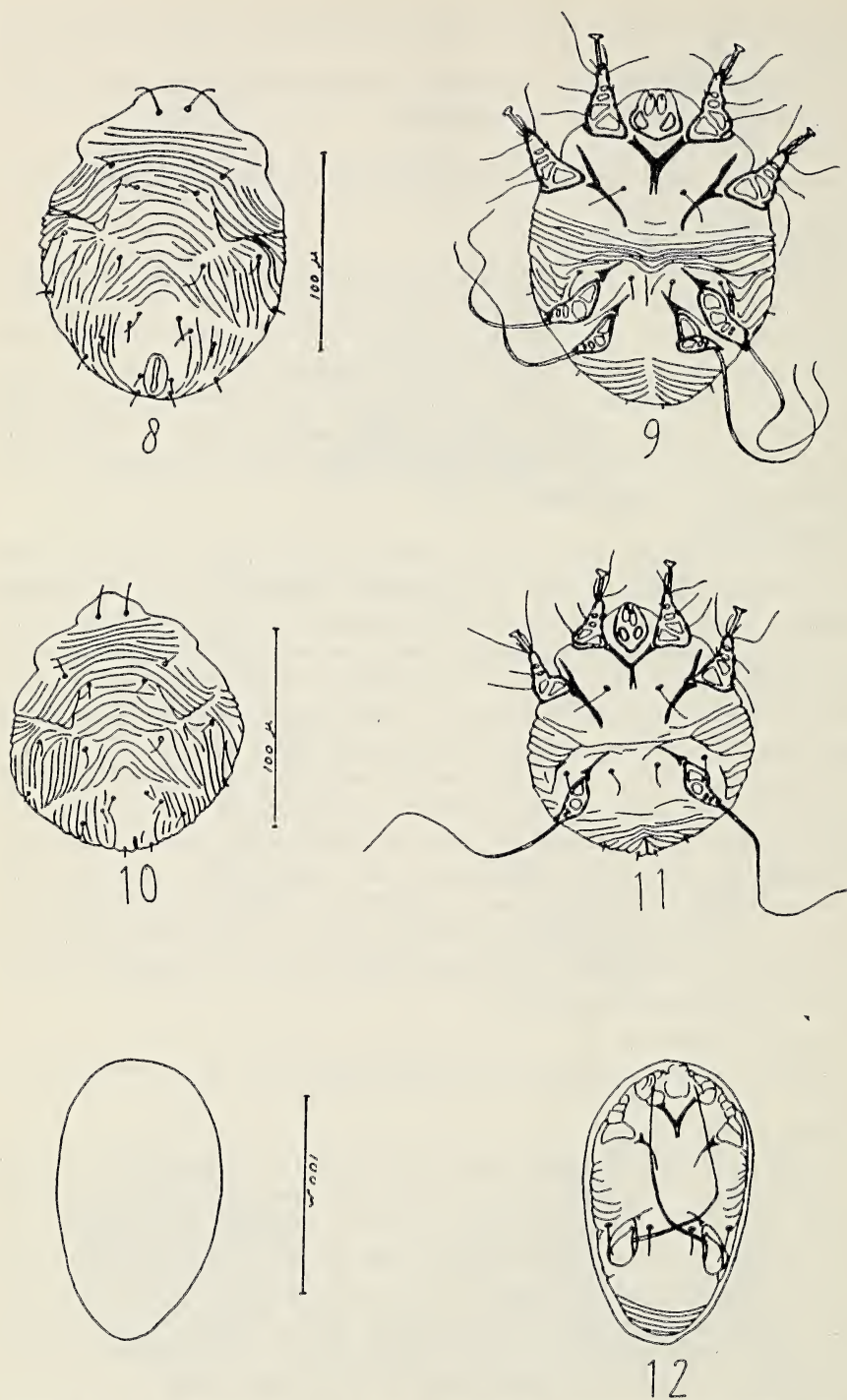
Subglobular. Length (idiosoma and gnathosoma) 250—282 μ , breadth 211—236 μ .

Dorsal surface.

Striated except for some small areas on the vertex and round the anus. There are about 22 striations from vertex to anus. On the vertex a pair of slender vertical setae. Length of scapular setae 23—27 μ , length of humeral setae 20—23 μ . Distance between internal scapular setae 47—51 μ , external scapular setae 86—90 μ , internal humeral setae 72—76 μ , and external humeral setae 160—168 μ . Near the lateral margins of the body a small seta is present. The preanal and paraanal setae are short and bristly, those forming an arch in front of the anus are 12—16 μ in length, the paraanal setae 9—11 μ . Anus dorsal.

Ventral surface.

Partly striated. Normal gnathosoma. Pairs of setae on gnathosoma, trochanters



Figures 8—12. *Notoedres centrifera* n. sp. 8. dorsum of protonymph, 9. ventral view of protonymph, 10. dorsum of larva, 11. ventral view of larva, 12. eggs.

I and II, between apodemata I and II, on coxae III and IV, trochanter III, and between the apodemata IV. The vulva, in the middle whereof the epigynium is seen, is a transverse slit just posterior to the apodemata II. The apodemata I are fused to a Y-shape, the stem being almost wholly split but it is probable that this stem has the configuration of a small gutter. Apodemata II and III normal, apodemata IV provided with long spurs at the lateral side. The chaetotaxy of the legs is as figured and the same as in other species of the genus. It should be noted that the setae on femora I and II are not located on the lateral margin but on the ventral side. The species under consideration has this feature, as well as the swollen appearance of legs I and II, in common with *Notoedres notoedres*.

Tritonymph (fig. 6, 7).

Resembles the female except for its smaller size, length $\times$ breadth: 156 — 204 $\times$ 121 — 149 μ . The epigynium is not present and the pair of setae between the apodemata IV is situated more posteriorly than in the adult female.

Protonymph (fig. 8, 9).

Differing from the tritonymph by its smaller size, length $\times$ breadth: 129 — 153 $\times$ 97 — 113 μ , the lack of setae on trochanters I, II, and III, and between apodemata IV.

Larva (fig. 10, 11).

Length $\times$ breadth: 113 — 153 $\times$ 78 — 113 μ . Chaetotaxy as in protonymph.

Egg (fig. 12).

Oval, length $\times$ breadth: 139 — 149 $\times$ 82 — 91 μ , one pole more blunt than the other.

Definition of *Notoedres centrifera* n. sp.

With the characteristics of the genus *Notoedres* Railliet, 1893, subgenus *Mesonoedres* n. subg. Subglobular. Dorsal surface striated except for some small areas, such as round the anus. Preanal and paraanal setae normal, short and bristly. Femora I and II have a swollen appearance with the setae located on the ventral side. Stem of the fused apodemata I wholly split. Apodemata IV provided with long spurs on the lateral side. Caruncles on pedicels on leg IV are wanting in the male.

Type (δ) and paratypes (δ δ and φ φ): Institute of Veterinary Parasitology and Parasitic Diseases of the State University, Utrecht.

Type host: *Ratufa bicolor*.

Type locality: private collection in the Netherlands.

Notoedres centrifera n. sp. has much in common with *N. alepis* and *N. notoedres*, but it can be easily differentiated due to the long spurs on apodemata IV (*centrifera* is derived from the Greek *κεντροφόρος* "spurred on") and the lack of stalked caruncles on leg IV in the male.

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Ontvetten. De meest gebruikte middelen hiervoor zijn thans wel wasbenzine en trichlooraethyleen. Zo lang alleen het lichaam (en dan vooral het abdomen) vervet is, voldoen ze wel. Al moet de trichloor wel volkomen zuiver zijn, anders worden de kleuren soms sterk aangetast. Zijn de vleugels echter ook min of meer vervet, dan lukt het bijna nooit een vlinder weer tot zijn oorspronkelijke staat terug te brengen. Bovendien plakken de haren van het lichaam en de franje vaak sterk aan elkaar en men kan later niet altijd dit euvel weer met een zacht penseel geheel verhelpen.

De heer CARON past een ander procédé toe, dat ik uit eigen ervaring zeer kan aanbevelen. De vlinder gaat eerst een dag in benzol en wordt dan nat en wel onmiddellijk in een bakje met magnesiumpoeder gelegd en geheel met deze stof bedekt, zodat alleen de punt van de speld er boven uit steekt. Ook daarin blijft het exemplaar een volle dag. Het resultaat is tot nog toe verbluffend. Een ♂ van *Hepialus humuli*, waarvan de vleugels al grotendeels vervet waren, werd weer even prachtig wit als toen het vers was. Kleuren worden niet aangetast, zelfs niet het tere groen. Ik heb het geprobeerd met *Calamia iridens* (*virens*) en *Geometra papilionaria*, beide beruchte verkleurders en vervetters. Ze waren na de behandeling „als nieuw". De franje kleefte nauwelijks aan elkaar en is zo nodig met een zacht penseel weer gemakkelijk in de goede stand te strijken. Ook het overtollige poeder verwijdt men zo. Het gelukte me alleen niet oude *Harpyia*'s (60 jaar en meer) uit de collectie van het Zoölogisch Museum te Amsterdam, die door het vervetten al jaren geleden geel geworden waren, weer mooi wit te doen worden. Wel exemplaren, die een jaar of 20 geleden gevangen waren.

Benzol en magnesiumpoeder zijn goedkope artikelen, die elke drogist kan leveren. De benzol kan gebruikt worden tot ze geel gaat worden, dus te veel vet opgenomen heeft. Dan moet ze beslist vernieuwd worden. Het poeder lijkt onbeperkt mee te gaan.

In geen geval twee of meer vlinders tegelijk los in het bad! De vleugels worden namelijk zeer bros, zodat ze onmiddellijk sterk beschadigen, als twee exemplaren door schudden tegen elkaar stoten. Na het drogen hebben ze echter weer hun normale hardheid.

Overigens dreigt bij het uit de vloeistof halen van teergebouwde soorten hetzelfde gevaar als bij de andere vloeistoffen, het oprollen van de achtervleugels van de binnenrand naar het midden. Dit gebeurde me bij een *Scopula imitaria* met sterk vervet achterlijf. Bij dergelijke dieren pas ik nu een andere methode toe. Ik vul de gleuf van het opzetblokje geheel met poeder en bedek er ook het hout mee. Dan maak ik in het poeder van de gleuf een klein richeltje waarin het abdomen past, steek de vlinder in het blokje tot op het poeder en bevochtigt nu het achterlijf met een penseel flink met benzol. Dan onmiddellijk de hele vlinder goed bedekken met poeder en na een dag is het euvel meestal verholpen. Zo niet, dan herhalen. De achtervleugels blijven nu goed in de vorm, ook al worden ze vochtig.

Ook andere insecten dan vlinders zullen wel op een van beide manieren behandeld kunnen worden. Denk er echter wel om, dat benzol zeer brandbaar is. — LPK.

Trekvlinders in 1962. Bij *Mythimna l. album* L. is een van de interessantste vangsten vergeten, nl. een exemplaar op 4 oktober te Bussum door de heer TER LAAG. Het is wel meegerekend bij het jaartotaal.

Op pag. 185, regel 11 van boven, moet 30.VII zijn: 30.VIII. — LPK.