



# Trends in the tachinid fauna of *The Netherlands* over the last forty years

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## Introduction

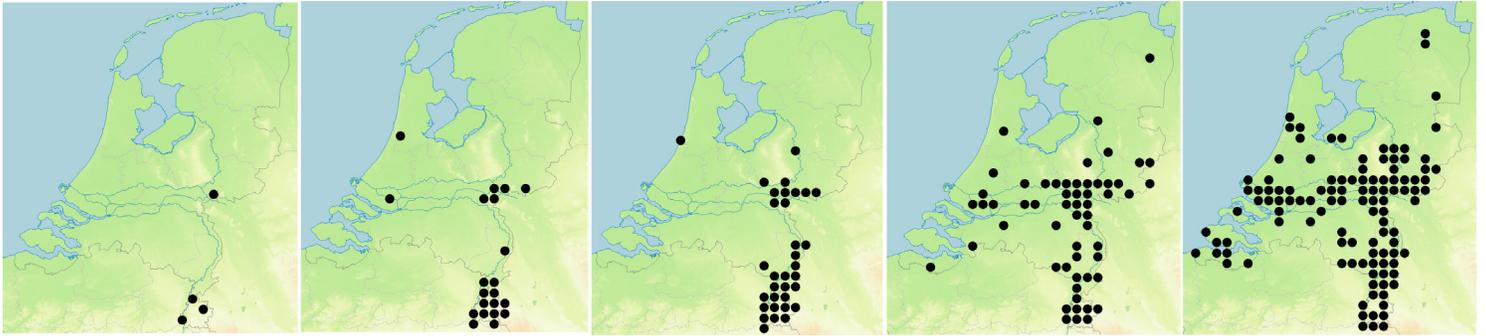
On April 6th, 1985, I caught and identified for the first time in my life a tachinid fly. It was a male of *Tachina* (*Servillia*) *ursina* Meigen. Therefore, last year I celebrated my fortieth anniversary as a tachinidologist. Looking back at forty years, I've seen huge changes in the tachinid fauna of the Netherlands. The aim of this article is to describe and analyze these changes over this period. This is based on both my personal observations, study of nearly all material collected, and on the large database filled by citizen scientist site [Waarneming.nl](https://www.waarneming.nl) (the local Dutch version of [Observation.org](https://www.observations.org), sister site of [iNaturalist.org](https://www.inaturalist.org)).

## Studies on trends of Diptera in western Europe

Trends in hoverflies (or flower flies, Syrphidae) are much better studied than those in tachinids. Long term negative trends have been reported for hoverflies in western Europe and can be considered well established (Gatter et al. 2020, Hallmann et al. 2021, Barendregt et al. 2022, Reemer et al. 2024, van Eck 2024, Zeegers et al. 2024). These trends are established based on large numbers of records often using sophisticated statistical techniques. This type of quality data is obviously not available for Tachinidae. Yet, the number of records of Tachinidae by citizen scientists in the Netherlands on [Waarneming.nl](https://www.waarneming.nl) has risen since 2010 to about 16,000 yearly in 2024 with photographic evidence, half of which has been positively validated. To illustrate the strength of this tool, note that no less than nine species have been recognized for the first time for the Netherlands based on [Waarneming.nl](https://www.waarneming.nl), 3% of all species ever recorded for the Netherlands. Clearly, conspicuous, large and flower-visiting tachinids can be expected to be overrepresented in this database as compared to small, dull and non-flower-visiting species.

## First impressions

It is clear from a quick look at the data that large changes have occurred in the presence and abundance of Dutch tachinid flies over the period 1985–2025. At least 11 species (= 3%) disappeared over this period, whereas 16 newcomers (= 5%) arrived. Many of the latter settled rapidly and are currently widespread. For instance, after the first record of *Cylindromyia bicolor* (Olivier) in the Netherlands in 2015, the species rapidly spread and now occupies two-thirds of the country (Fig. 1). In summer, one can almost literally follow its expansion in real life on the screen of [Waarneming.nl](https://www.waarneming.nl). Similar expansions can also be found in species already present before 1985, such as *Dexia rustica* (Fabricius).



**Figure 1.** Validated records of *Cylindromyia bicolor* on [Waarneming.nl](http://Waarneming.nl) for the years (left to right) 2017, 2019, 2021, 2023 and 2025.

On the other hand, some species that were relatively common in the 1980s have disappeared, such as *Allophorocera ferruginea* (Meigen). More difficult to investigate is the decrease in abundance over time, but in some cases it is obvious. For example, in the 1980s *Panzeria* (or *Eurithia*) *anthophila* (Robineau-Desvoidy) could be found in August on every tenth umbellifer, but in 2025 the number of validated records for all of the Netherlands, produced by a much larger army of citizen scientists, was only 65.

## Materials and methods

For the assessment of the trend for each species over the period 1985–2025, I have used three main sources:

- my personal experience
- database of collected material of Dutch Tachinidae
- validated records of Tachinidae on [Waarneming.nl](http://Waarneming.nl) (mostly from the last decade)

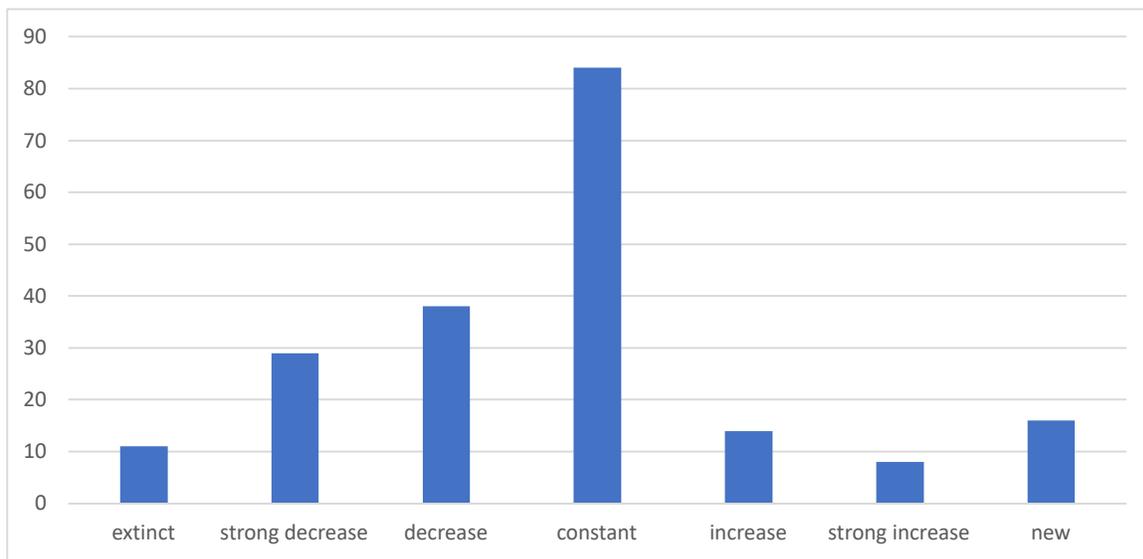
Information on the database of collected material up until 1995 can be found in Zeegers (1998). This database contains records from the field, Malaise traps and reared specimens. The other two sources are dominated by field records. Based on these sources, a trend status is assigned to each species according to the definitions in Table 1. This is not a rigorous statistical process, but an expert judgement. A conservative approach has been applied. When in doubt, the lesser extreme value was assigned.

**Table 1.** Definitions of trend status.

| Status           | Criteria  |
|------------------|---|
| New              | established after 1985                                |
| Strong increase  | more than 75% increase over 1985–2025                 |
| Increase         | more than 33% increase over 1985–2025                 |
| Constant         | between +/- 33% over 1985–2025                        |
| Decrease         | more than 33% decrease over 1985–2025                 |
| Strong decrease  | more than 75% decrease over 1985–2025                 |
| Disappeared      | recorded after 1985, but apparently no longer present |
| Not recent       | not only recorded before 1985                         |
| Too rare to call | data deficit  |

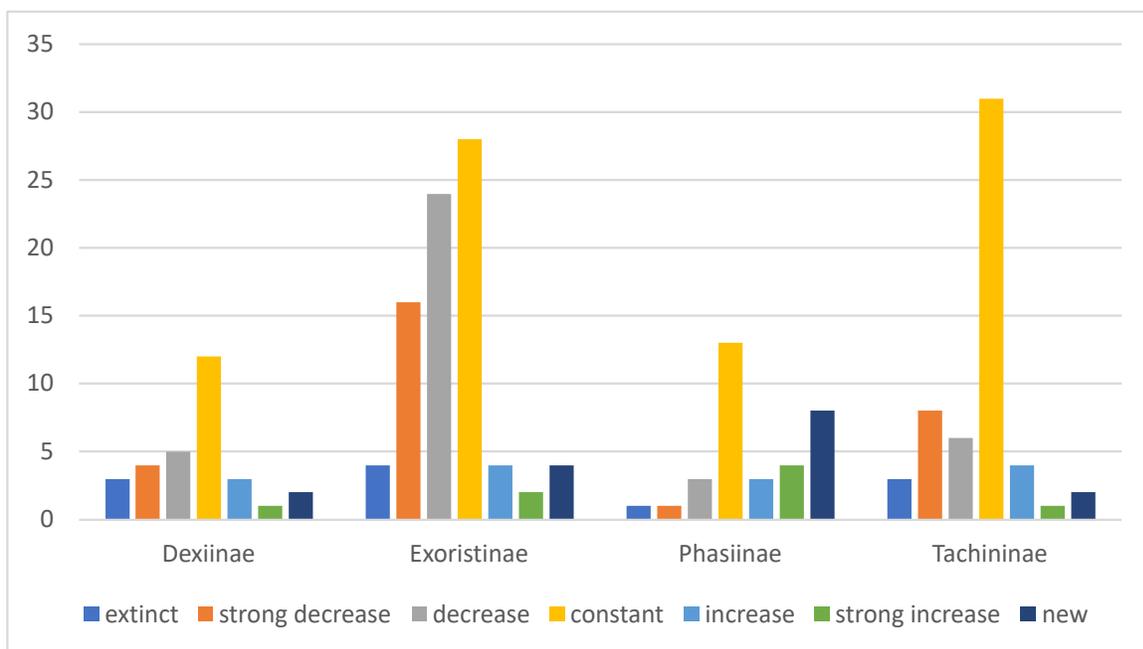
## Results

Of the 345 species of tachinid flies ever found in the Netherlands, trends could be established for 200 species. Fifty-nine of them have not been found after 1985 and 86 are considered “too rare to call”. For species with a trend assigned, two-fifths (84) are considered ‘constant’, two-fifths (78) are decreasing, and only one-fifth (38) are increasing (Fig. 2). So, the general picture is highly dynamic, but with twice as many species decreasing as increasing. Only for ‘new’ the trend is more positive than ‘extinct’, however, that is excluding the 59 species present before 1985 and not present afterwards.



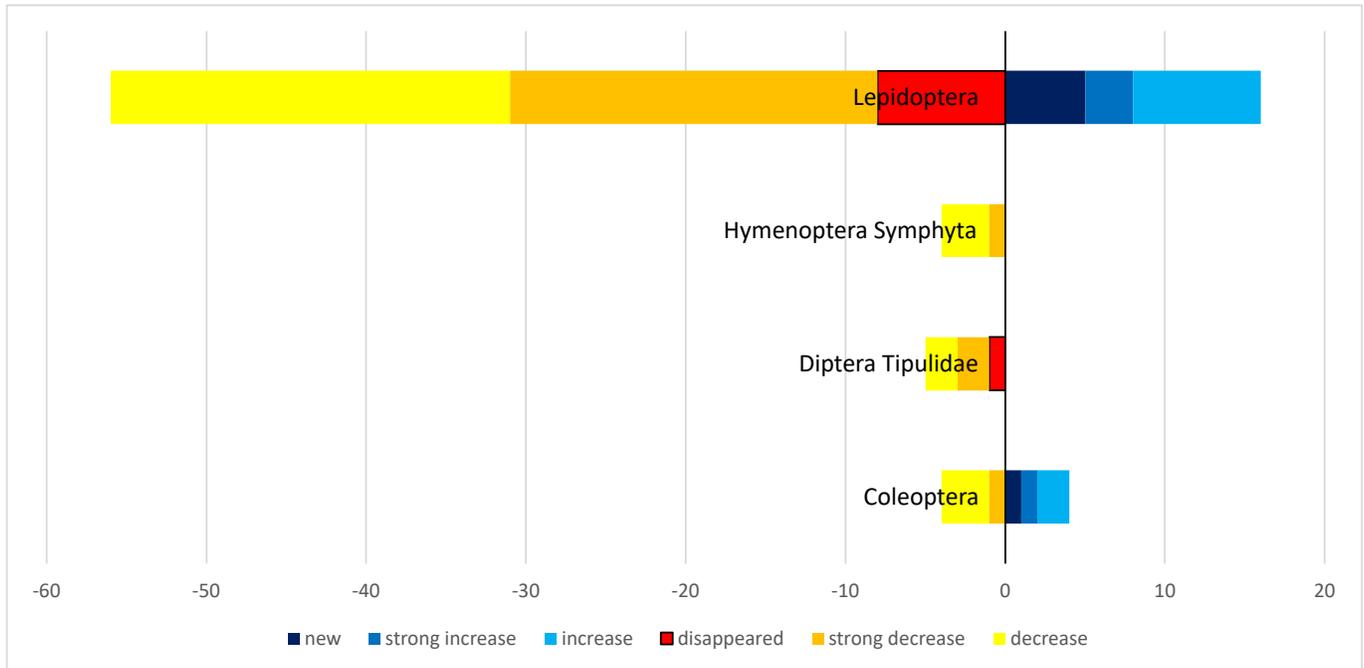
**Figure 2.** Number of species per trend class (Table 1) for the 200 species with an assigned trend.

When we consider the trends since 1985 for the four subfamilies, we find significant differences (Fig. 3). As expected (see below), the Phasiinae have a generally more positive trend, whereas the Exoristinae perform much worse than average.



**Figure 3.** As per Fig. 2, per subfamily.

The hosts of Tachinidae are better known in Europe than elsewhere in the world and have been documented in the Palaearctic host-tachinid catalogue of Tschorsnig (2017). Looking at relations between trends and insect order of hosts, we have already dealt with the Heteroptera because this group of tachinids is identical with Phasiinae. For the other four large host orders, parasitoids of Coleoptera have on average a neutral trend, hence they perform better than the whole family on average (Fig. 4). Tachinids on Diptera (= Tipulidae) and Hymenoptera (= Symphyta) are all or nearly all decreasing. Tachinid parasitoids on Lepidoptera (the majority of Exoristinae and Tachininae), by far the largest group, have more than three times species decreasing in a broad sense than increasing, distinctly worse than for the whole family (twice as much decreasing as increasing).



**Figure 4.** Number of species with an increase in broad sense (= increase, strong increase, new) and decrease in a broad sense (= decrease, strong decrease, extinct) for the four main host orders other than Heteroptera.

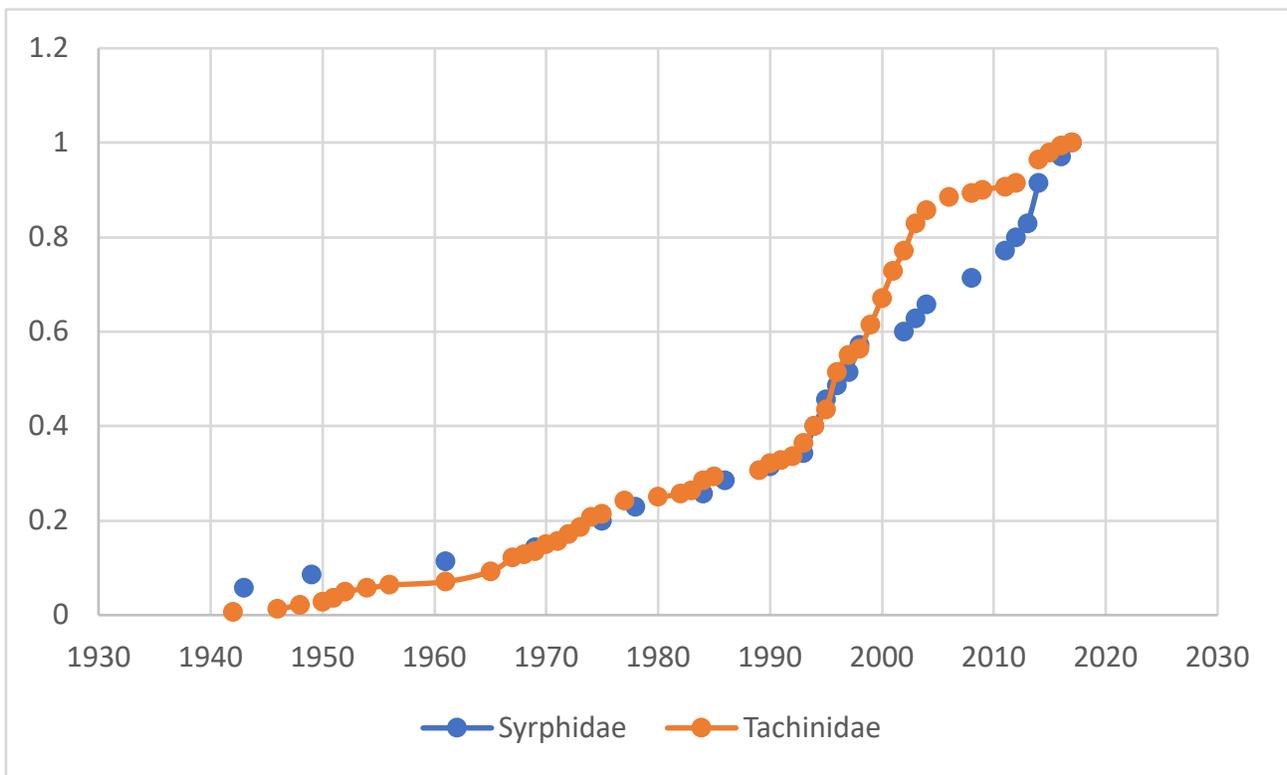
One might argue that flower-visiting species are prone to over-recording by citizen scientists (Ball & Morris 2021). No doubt, this is indeed the case, but there is more going on. While species like *Cylindromyia brassicaria* (Fallén), *C. bicolor*, *Ectophasia crassipennis* (Fabricius) and *Phasia aurigera* (Egger) have undoubtedly rapidly increased, in my experience similar species like *Cylindromyia interrupta* (Meigen) and *Phasia obesa* (Fabricius) have not. Both flower-visiting phasiines *Labigastera forcipata* (Meigen) and *Leucostoma simplex* (Fallén) are on the brink of extirpation in the Netherlands, if they have not already disappeared. Also in other subfamilies, it makes sense to consider sibling species. *Peleteria iavana* (Wiedemann) and *Nowickia ferox* (Panzer) are becoming much more common, while the similar *Peleteria rubescens* (Robineau-Desvoidy) hardly is. The genera *Athrycia* (three species) and *Hyleorus* seem to have vanished from the Netherlands, while *Cyrtophloeoba ruricola* (Meigen), which used to be much rarer, is now regularly recorded even by citizen scientists. Some Exoristinae, like *Phryxe vulgaris* (Fallén), *Phryno vetula* (Meigen) and *Blondelia nigripes* (Fallén) decreased significantly, while *Epicampocera succincta* (Meigen) did not.

To investigate whether a bias is present in our data due to flower visiting, I divided the species into regular versus non-regular flower visitors. I exclude the Phasiinae, since the expansion of many species of Phasiinae in Central Europe is well documented even based on non-photographic evidence (Ziegler 2011). For the remaining species, 40 of the 75 non-regular flower visitors are in decline (53%), whereas for flower visitors the numbers are 27 of 66 (40%). While it seems there might indeed be some bias favouring flower visitors, the difference is not statistically significant and in any case is so small that it can play at best a secondary role. Significantly more decrease than increase is found in both flower visiting and non-flower visiting species.

All in all, the data are admittedly not ideal, but the dynamics observed, in many cases with backup from my personal experience, are too large to be considered artifacts of the dataset. The tachinid fauna of the Netherlands has changed significantly over my lifetime, and not all for the better. Also, nearly all newly-recorded species have likely expanded their ranges due to climate change, so even the positives are negative in many cases.

## Year of last recording

Many species of tachinids supposedly present in the Netherlands in 1939 (de Meijere 1939) have not been recorded after 2017, 140 to be precise. This may be due to the fact that they are extremely rare, difficult to find (for instance only with Malaise or pan traps), or must be reared. Or because they have really disappeared. For each species, the year of last recording is established. With that information, for each given year between 1940 and 2017, we can count the total number of species not recorded thereafter. Figure 5 this number of supposedly extirpated species per year, relative to the final number of extirpated species in 2017. It also shows the same information for hoverflies (Zeegers et al. 2024). The number of extirpated species in 2017 is for Tachinidae much higher (140) than for Syrphidae (35), hence, to compare the shape of the graphs, I calculated the values for each year relative to the number of extirpated species in 2017 (hence, a fraction between 0 and 1, the “cumulative fraction”). Then, the resemblance between both graphs is, in my opinion, stunning. The disappearing rate (the derivative of the graph) has a distinct discontinuity around 1990, after which it is much higher than before. The effect is even stronger in tachinids than in hoverflies. For wild bees, there is no such discontinuity (Zeegers et al. 2024). Since bees are at a lower trophic level than both tachinids and hoverflies, it is tempting to assume that the underlying causes of the discontinuity for tachinids and hoverflies might be the same.



**Figure 5.** Number of extirpated species up to a given year relative to the total number of extirpated species in 2017 for Syrphidae (blue, number of extirpated species = 35) and Tachinidae (orange, number of extirpated species = 140). Year is on X-axis and cumulative fraction on y-axis (see text).

## Acknowledgements

I am grateful to everyone who shared their observations with me and the army of photographers posting on [Waarneming.nl](https://www.waarneming.nl). Bob van Aartsen was responsible for more of half of all records before 2000, hence making an indispensable contribution to the baseline of the database.

## References

- Ball, S.G. & Morris, R.K.A. 2021. Is photographic recording influencing published trends in the relative frequency of invertebrates? *British Journal of Entomology and Natural History* 34: 237–251.
- Barendregt, A., Zeegers, Th., Steenis, W. van & Jongejans, E. 2022. Forest hoverfly community collapse: abundance and species richness drop over four decades. *Insect Conservation and Diversity* 15(5): 510–521. <https://doi.org/10.1111/icad.12577>
- Eck, A. van. 2024. Composition of soldier flies (Diptera, Stratiomyidae) and hoverflies (Diptera, Syrphidae) in Malaise traps in two nature reserves in the Netherlands. Two research periods compared. *Fly Times* 73: 21–40.
- Gatter, Wu., Ebenhöf, H., Kima, R., Gatter, Wa. & Scherer, F. 2020. 50-jährige Untersuchungen an migrierenden Schwebfliegen, Waffenschwebfliegen und Schlupfwespen belegen extreme Rückgänge (Diptera: Syrphidae, Stratiomyidae; Hymenoptera: Ichneumonidae). *Entomologische Zeitschrift Schwanfeld* 130: 131–142.
- Hallmann, C.A., Ssymank, A., Sorg, M., Kroon, H. de & Jongejans, E. 2021. Insect biomass decline scaled to species diversity: general patterns derived from a hoverfly community. *PNAS* 118(2) e2002554117. <https://doi.org/10.1073/pnas.2002554117>
- Meijere, J.C.H. de. 1939. Naamlijst van Nederlandsche Diptera afgesloten 1 April 1939. *Tijdschrift voor Entomologie* 82: 137–174.
- Reemer, M., Smit, J.T. & Zeegers, Th. 2024. Basisrapport voor de Rode Lijst Zweefvliegen 2023. EIS Kenniscentrum Insecten EIS2024-03. <https://kenniscentruminsecten.nl/publicaties/basisrapport-voor-de-rode-lijst-zweefvliegen-2023/>
- Tschorsnig, H-P. 2017. Preliminary host catalogue of Palaearctic Tachinidae (Diptera). <https://www.uoguelph.ca/nadsfly/Tach/WorldTachs/CatPalHosts/Home.html>
- Zeegers, Th. 1998. An annotated checklist of the Dutch tachinid flies (Diptera: Tachinidae). *Entomologische Berichten* 58 (9): 165–200.
- Zeegers, Th., Steenis, W. van, Reemer, M. & Smit, J.T. 2024. Drastic acceleration of the extinction rate of hoverflies (Diptera: Syrphidae) in the Netherlands in recent decades, contrary to wild bees (Hymenoptera: Anthophila). *Journaal van Syrphidae* 3 (1): 1–11. <https://www.syrphidaeintrees.com/jvs/volumes/pdf-volume-3-no-1>
- Ziegler, J. 2011. Rezente Arealerweiterungen bei Wanzenfliegen (Diptera: Tachinidae, Phasiinae) in Nordostdeutschland und eine Übersicht zur Gesamtverbreitung von fünf Arten. *Studia Dipterologica* 18: 29–54.