A tachinid with a homeotic mutation – a report and a challenge to fellow collectors

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Figures 1–2. The head of a male *Gonia divisa* Meigen with an antennal deformity. **1**. Head in left lateral view. Note the abnormally dilated left third antennal segment with an additional but somewhat truncated apical arista. The partial bifurcation of the antenna indicates that the developing antenna has had two regions with apical identity. **2**. Head in right lateral view showing the normal right antenna as a comparison. No other deformities were observed on this specimen.

When determining a collection of tachinids from a friend, I came across a male *Gonia divisa* Meigen, 1826 from Vanaa, Finland (Vehkalanmäki, 15 April 2008, J. Kahanpää leg.) having an additional terminal arista on the left antenna (Figs. 1–2). Similar animal monstrosities and deformations have always attracted attention from a wide audience and stirred the imagination of early naturalists. Due to their sheer numbers, rare deformities are easier to come across in insects and even some papers have been published on the topic in the past (Hagen 1876, Gauss 1962). Although a seemingly minor defect, the feature reported here proved to be very interesting, thanks to the detailed work on fruit fly (*Drosophila*) development.

Although most of the described cases from wild insects are due to non-genetic disturbances during the pupal development, the most interesting deformities include the transformation of body parts into others – such as in the case of the classical *Drosophila* mutant *antennapedia*, in which legs grow in the place of antennae. These transformations are genetic and are caused by so-called homeotic mutations that affect master regulatory genes required for the correct identity of body parts in the developing embryo.

Because there are dozens of genes involved in the patterning of body parts, not all homeotic mutants are as dramatic as the *antennapedia*. For example, in the antennal patterning several genes are involved in the assignment of correct insertion site, proximo-distal axes and segmentation (Cesares & Mann 1998, Ahn *et al*. 2011). Although the arista of cyclorrhaphous flies is located at the base of the third antennal segment, it is developmentally the apical part of the antenna. In *Drosophila*, this apical identity is controlled by the JAK/STAT pathway (Ayala-Camargo *et al*. 2007). Interestingly, the loss of

JAK/STAT signaling in the developing *Drosophila* antenna disturbs the apical identity and can create an identical double-arista as seen in the *Gonia* specimen (Figs. 1–2; cf. fig. 2I in Ayala-Camargo *et al*. 2007). Because the feature is present only on the left antenna in this *Gonia* specimen, it is likely that the feature results from a random somatic mutation that has occurred at some point in the lineage of cells forming the apical section of the left antenna. Unfortunately, the JAK/STAT pathway itself has many components, so it is impossible to decipher which part of the pathway is affected. The mutation is not hereditary and probably would have not affected the fitness of the individual to a great extent.

As a friendly invitation, I challenge all *Tachinid Times* readers to report their tachinid monsters in forthcoming issues of this newsletter. Although a curiosity, data on some naturally occurring mutants might prove to be useful as our understanding of insect development deepens.

Acknowledgments

I would like to thank Dr. Hans-Peter Tschorsnig, Stuttgart, Germany, for encouraging me to report the finding.

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