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On the genus *Pilophorus* HAHN (Hemiptera: Miridae) in Guilan province and adjacent areas

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Abstract

In plant bugs of miridae, the species in the genus of *Pilophorus* HAHN have been known as predators on mites, aphids, psyllids, leafhoppers, small lepidopterous larvae. Three species of genus *Pilophorus*, including *Pilophorus confusus* (KIRSCHBAUM 1856), *Pilophorus cinnamopterus* (KIRSCHBAUM 1856) and *Pilophorus perplexus* (DOUGLAS & SCOTT 1875) have been reported previously from Iran especially from Guilan province. These species have some similarities which make them difficult to correctly identify for non experts. In this article a brief morphological description and figures of male genitalia was provided for each species.

Key words: Hemiptera, Miridae, *Pilophorus*, identification.

Zusammenfassung

Die Gattung *Pilophorus* HAHN aus der Wanzenfamilie Miridae ist bekannt als Räuber von Milben, Blattläusen, Blattflöhen, Zikaden und kleinen Schmetterlingslarven. Die drei aus dem Iran, insbesondere aus der Provinz Guilan, bekannten Arten *Pilophorus confusus* (KIRSCHBAUM 1856), *Pilophorus cinnamopterus* (KIRSCHBAUM 1856) und *Pilophorus perplexus* (DOUGLAS & SCOTT 1875) zeichnen sich durch teilweise schwierige Unterscheidbarkeit aus. Vorliegende Arbeit liefert Beschreibungen und Abbildungen, um die bessere Trennung zu ermöglichen.

Introduction

The Plant bug family Miridae comprises many genera rich in species. Among them some are either harmful or beneficial. The harmful bugs are those that suck the plant sap and injure the plant or damage the reproductive organ. In contrast the beneficial bugs are those that prey on and destroy the harmful arthropods that feed on the plant (SCHUH & SLATER 1995). These predaceous species are not well known despite their economic importance. One such genus is *Pilophorus* HAHN which has been reported to prey on mites, aphids, psyllids, leafhoppers, small lepidopterous larvae and other soft-bodied arthropods that feed on plant (KELTON 1982). Phylinae subfamily comprise six tribes. Among 13 genera in Pilophorini, *Pilophorus* HAHN contains 105 species which are difference in size and color (SCHUH 2008).

The Guilan province enjoys a very diverse climate conditions. This remarkable aspect has prevailed the province with a variety of flora and fauna. Owing to the rich fauna of the province and the importance of insects as biological and ecological factors in an environment as a result identification of the harmful and useful species in the area are of the immense necessary.

The plant bugs fauna of Iran has poorly been studied. However, a number of publications has been published on Iranian plant bugs in different regions (HOSSEINI 1997, 2000, 2002; LINNAVUORI & HOSSEINI 1998, 1999, 2000; LINNAVUORI 2006, 2007, 2009; ARKANI et al. 2011, LASHKARI et al. 2012, LASHKARI & HOSSEINI 2012, EBRAHIMI et al. 2012).

Faunal studies and identification of species found in each environment is the first step before any biological or ecological studies. This paper is based on materials collected from Guilan province preserved in the Natural Museum of University of Guilan (Rasht, Iran).

Materials and Methods

Collection of specimens

The beating stick and bush net (50 cm diameter) was used for collecting mirids on branches of trees. This method was a very useful and productive method compare to other methods. For this method the bush net held under a branch (or branch kept inside the bush net) and the branch was sharply struck with the stick. The bugs felt on the bush net were quickly picked off by an aspirator. Then collected specimens were killed promptly in a small tube contains Ethyl acetate. Specimens after transferring to the laboratory were mounted on rectangular cards. Identification was done by relevant taxonomic keys (WAGNER 1973, WAGNER & WEBER 1964). Identified species were confirmed by mirid specialist Dr. R.E. Linnavuori. All species are kept in the insect collection of the Natural Museum of University of Guilan.

Results and Discussion

Genus *Pilophorus* HAHN

CASSIS & SCHUH (2012) in the new revision of Mirid bugs systematic proposed that subfamily of Phylinae comprises six tribes which *Pilophorus* genus belongs to Pilophorini.

Species in this genus are antlike. Body color usually is black or brown. Antennae robust. Article II long and thick, thicker than the other articles and longer than III and IV. Head oblique, base of head convex, overlapping apex of pronotum. Scutellum tumid with clump of sericeous pubescence. Hemelytra banded with transverse bars of sericeous pubescence. *Pilophorus* species are active predators on trees which feed on aphids and other small insects.

Key to species of *Pilophorus*

- 1 Head, pronotum and hemelytra with erected hairs, in addition to short hairs *P. confusus*
 1' Head, pronotum and hemelytra without erected hairs, only in the apical part of the corium are sometimes a few long hairs 2
 2 Article 4 of the antennae clear, except the top is brownish *P. cinnamopterus*
 2' Article 4 of the antennae not clear *P. perplexus*

Pilophorus confusus (KIRSCHBAUM 1856)

Material examined: Many specimens. Iran, Guilan province: Tutkabon (36°53'30" N, 49°31'43" E, elev. 181 m), 29.v.-28.vi.1995; Darreh Dasht (36°48'10" N, 49°38'24" E, elev. 1144 m), 27.v.-20.vi.1995, 10.vii.1996; Rasht (37°15'37" N, 49°35'25" E, elev. 1.5 m), iv.-vi.1995, vi.-viii.1996; Masuleh (37°09'14" N, 48°59'11" E, elev. 1023 m), 6.-26.vi.1995, 28.vii.1996; Gyssom (37°40'17" N, 49°02'46" E, elev. -19 m), 11.-16.vi.1995, 30.vi.-2.vii.1996; Damash (36°43'09" N, 49°47'40" E, elev. 1806 m), 30.vii.-6.viii.1996; Rustam Abad – Salan Sar (36°54'36" N, 49°26'20" E, elev. 741 m), 24.vii.1996; Deylaman (36°53'05" N, 49°54'26" E, elev. 141 m), 16.-20.vii.1996; Ammar Loo – Bareh Sar (36°42'35" N, 49°52'12" E, elev. 1326 m), 27.vii.2002; Ziba Kenar (37°25'44" N, 49°52'41" E, elev. -24 m), 21.vii.-1.viii.2002. Ardabil province: Majareh – Khalkhal (37°34'06" N, 48°36'25" E, elev. 1951 m), 27.vii.1996; Majareh – Kolor (37°31'46" N, 48°37'42" E, elev. 1919 m), 21.vii.1996; 10 km W of Khalkhal (37°37'57" N, 48°30'33" E, elev. 1765 m), 8.-9.vii.2002; Givi (37°40'40" N, 48°28'36" E, elev. 1642 m), 9.-11.viii.2002.

Comments: On deciduous trees, often *Salix*, Quince and Plum. *Pilophorus confusus* occurs throughout Europe and extends into Siberia (CARVALHO 1958). Many countries in Asia and North America (AUKEMA & RIEGER 1999). This species has been found on *Alnus*, *Populus*, *Salix* and *Rumex* (STICHEL 1956 cited in KELTON 1982).

This species has been reported from Mazandaran province (Hassan Abad, 6.-7.vii.1995, Chalus, 16.-17.vii.2002) and Tehran province: Evin, 14.-18.vii.1995; Alborz province: Karaj, 12.-13.vii.2002) by LINNAVUORI (2007).

Body length 3.5-3.7 mm, width 1.4-1.5 mm. Vertex 2× wider than the eye. 2nd article of antenna 1.5× longer than wide of pronotum. Head between eyes black, below eyes brown. Pronotum and scutellum black. Hemelytra prunose, mostly brown, short; Head between eyes black, below eyes brown. Pronotum and scutellum black. Hemelytra brown, cuneus and wing membrane abbreviated, pilose pubescence golden, long and erect, intermixed with short, sericeous hairs, apex of corium with row of long setae; wing membrane with large basal area brown. Ventral surface black, legs brown. Left paramer has a long upraised sensory lobe (Fig. 1B). Right paramer and vesica are shown in Fig. 2-4B.

The nymphs and adults were found abundant in Rasht on Quince and observed to be predaceous on aphids, mites and usually searching for small arthropods. Fig. 5 shows *P. confusus* nymphal stages. This species is easily separated from two other species by reduced hemelytra and by strongly pilose pubescence on the dorsum (Fig. 6A).

KINGHT (1924) reported the species praying on aphids. LORD (1949) observed the species preying on mites and MACPHEE & SANFORD (1954) reported the species preying on mites and codling moth larvae (cited in KELTON 1982).

***Pilophorus cinnamopterus* (KIRSCHBAUM 1856)**

M a t e r i a l e x a m i n e d : Iran, Tehran: Evin, (35 47 34 N, 51 23 43, elev. 1622 m) several specimens, 14.-18.vii.1995.

C o m m e n t s : On *Pinus*. Euro-Siberian. Holarctic (WAGNER & WEBER 1964), Europe, Asia (AUKEMA & RIEGER 1999).

Body length 4.1-5.2 mm. Body color blackish brown, glabrous. top of 2nd segment of antennae black, base of 3rd article yellow and whole 4th article clear. Hemelytra cinnamon-brown, the apex darker. Base of cuneus equipped with a transverse silvery line. Vertex only 2 times wider than the eye. Article 2 antenna 1.5 times longer than the width of the head. Rostrum, extends up, hips intermediate. Figures of vesica and parameres are shown in Figs. 1-4 (C).

This species lives on the pine. Adults have been found from *Pinus* sp. In this species the posterior band is continuous across the forewings. However, *P. cinnamopterus* has rather more orange-brown forewings than *P. perplexus* and is associated with pine tree rather than deciduous trees. Hibernate as egg (WANGER & WEBER 1964).

***Pilophorus perplexus* (DOUGLAS & SCOTT 1875)**

M a t e r i a l e x a m i n e d : Iran, Gilan: Masuleh (37°09'14" N, 48°59'11" E, elev. 1023 m), 3 specimens, 6.-26.vi.1995, 3.vii.1996, 4.-5.viii.2002.

C o m m e n t s : This species has been reported from Tehran: Shahrestanak, 10.-12.vii.1995 by LINNAVUORI (2007). On deciduous trees such as *Acer*, *Alnus*, *Fraxinus* and *Quercus* (KELTON 1982). Distributed all around Europe, many countries in Asia (West-Palaeartic) and North America (AUKEMA & RIEGER 1999).

Body size 4.5-5 mm. Color as *P. clavatus*, but slightly more brownish. Vertex almost two times larger than eye. Article 2 of antennae 1.3-1.4 times longer than the width of the head. The rostrum reaches the posterior hips. Posterior edge of the corium equipped with

a single row of hairs erected. Pronotum at least 1.2 times wider than the head. In its left paramere right-hand edge barely sinuate and sensory lobe is smaller than two other species.

This species also lives on deciduous trees (*Fraxinus*, *Alnus*, *Tilia*, *Acer*, *Quercus*, *Pirus*, *Salix*) (KELTON 1982). This species hibernates as egg (WAGNER & WEBER 1964).

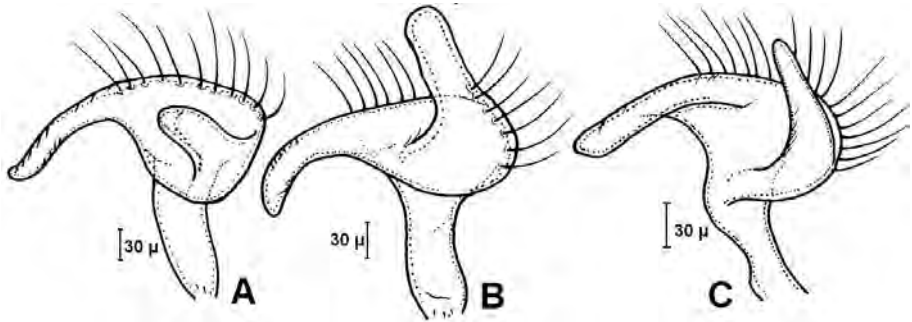


Fig. 1: Left paramere in *Pilophorus* species. *P. perplexus* (A), *P. confusus* (B), *P. cinnamopterus* (C).

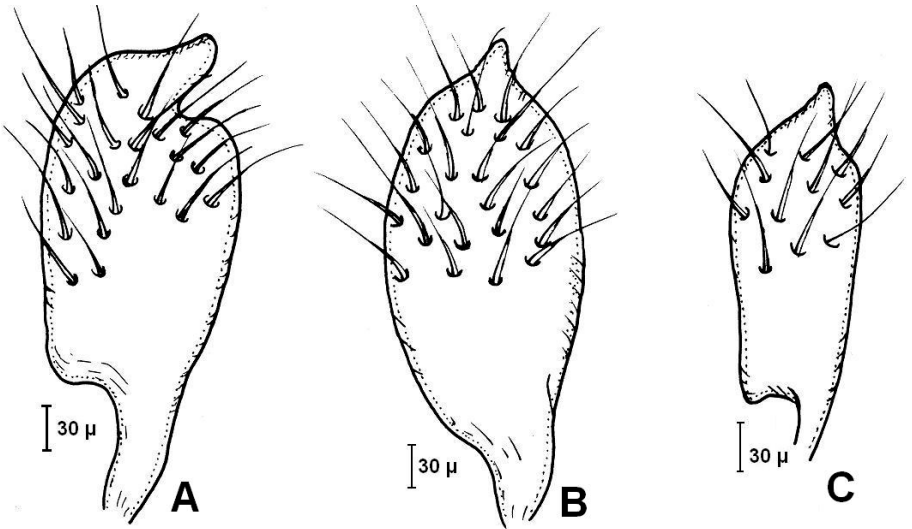


Fig. 2: Right paramere in *Pilophorus* species. *P. perplexus* (A), *P. confusus* (B), *P. cinnamopterus* (C).

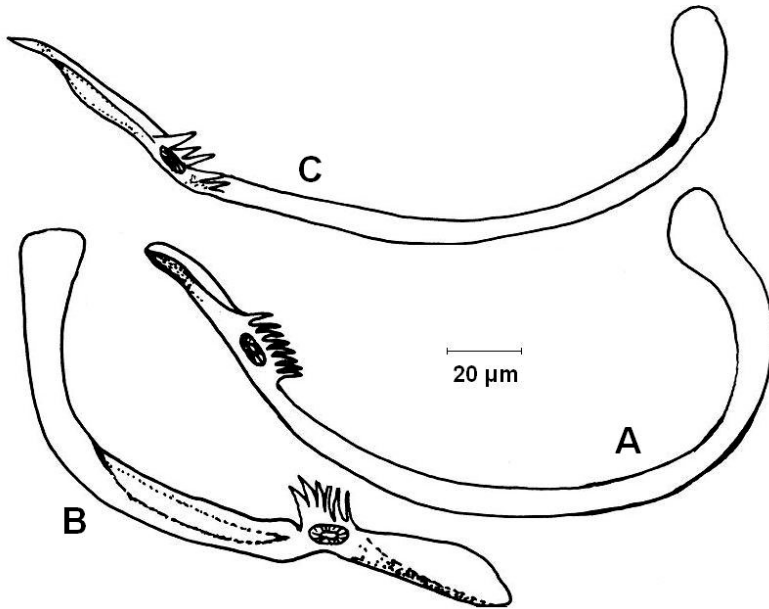


Fig. 3: Vesica in *Pilophorus* species. *P. perplexus* (A), *P. confusus* (B), *P. cinnamopterus* (C).

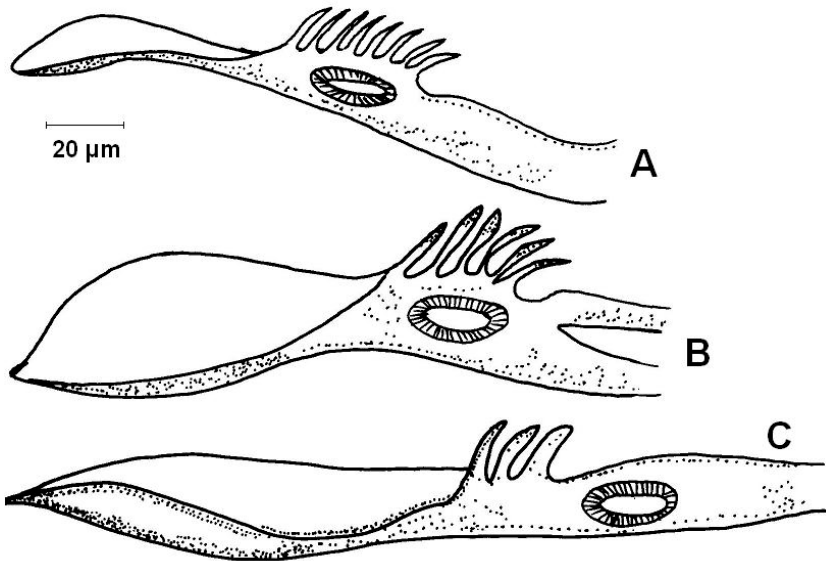


Fig. 4: Apical part of vesica in *Pilophorus* species. *P. perplexus* (A), *P. confusus* (B), *P. cinnamopterus* (C).

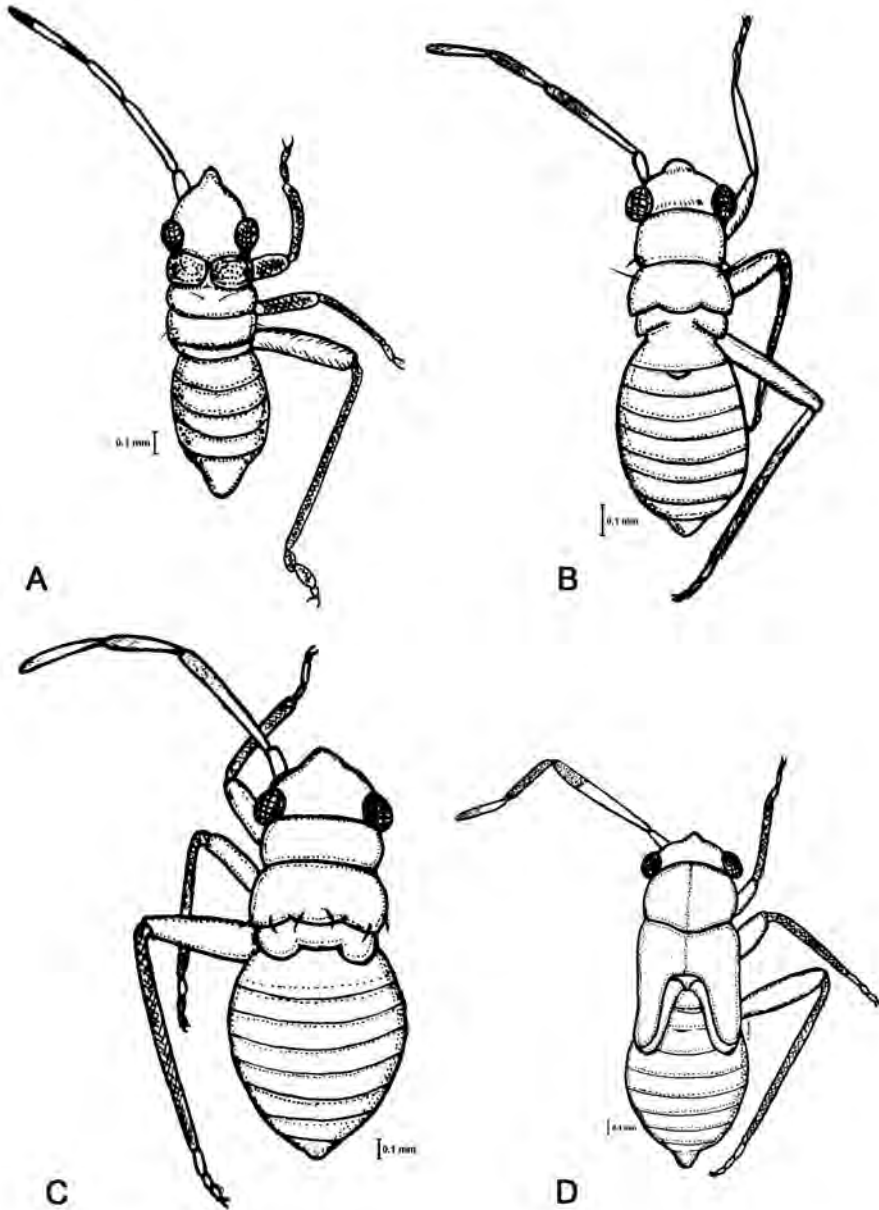


Fig. 5: Nymphal stages in *P. confusus*. Instar 1 (A), Instar 2 (B), Instar 3 (C), Instar 4 (D).

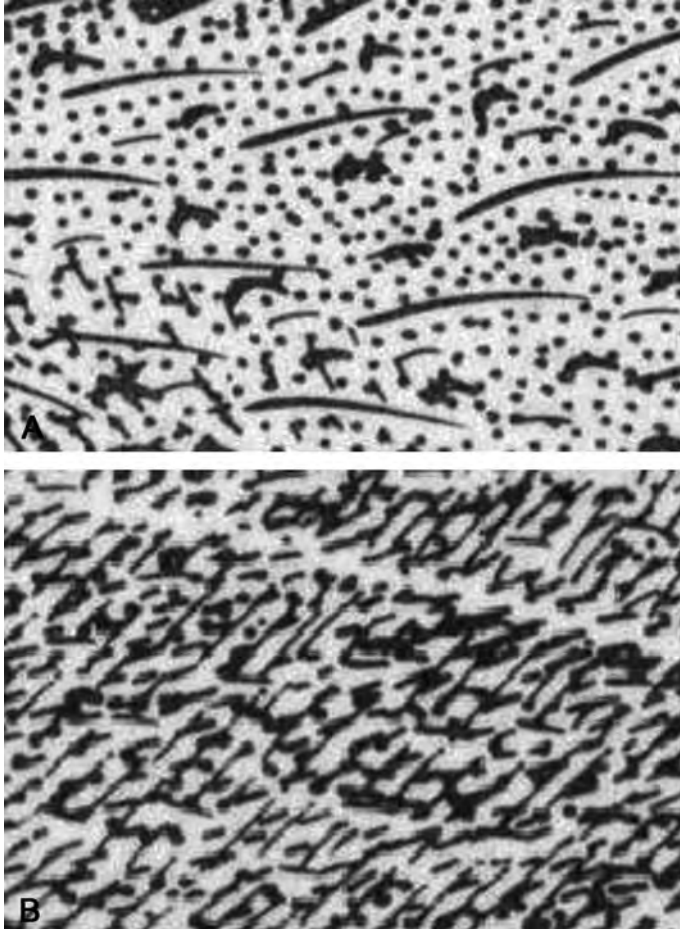


Fig. 6: Pubescence on hemelytra in *P. confusus* (A), *P. perplexus* (B).

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Buchbesprechung

WAGNER D.L., SCHREIBER D.F., SULLIVAN J.B. & R.L. REARDON: **Owlet Caterpillars of Eastern North America.** – Princeton University Press, Princeton, 2011. 576 S.

Eulenfalter (Noctuoidea) sind mit weltweit 75.000 Arten eine der erfolgreichsten Organismengruppen unseres Planeten. Die Raupen einiger Arten sind Schädlinge in Wäldern oder landwirtschaftlichen Kulturen, die große Mehrheit liefert eher einen "positiven" Beitrag zur Ökologie unserer Umwelt, sei es als Futter für Vögel, Nagetiere und andere Wirbeltiere, als Makrokompostierer und Bestäuber.

Diese gewichtige "Monographie" behandelt über 800 Arten mit mehr als 2.100 Fotos von Raupen und Faltern der Familien Erebidae, Euteliidae, Nolidae und Noctuidae. Neben dem üblichen, einführenden Kapitel zur Biologie wird auch ein großes Augenmerk auf die Themen "wie finde ich Raupen", mit welchen Techniken kann ich sie fangen (Klopfen, Streifen, Ködern) und züchten - Themen, die in der europäischen Literatur eher verpönt sind. Hier soll nur darauf hingewiesen werden, dass "undercollecting is a greater peril to most Lepidoptera than overcollecting". Ob im Zuge diverser "DNA barcoding"-Projekte im europäischen Raum eine größere Akzeptanz in diesem Sinne erreicht wird, bleibt zu hoffen.

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Eine sehr umfassende, fantastische Darstellung zur Raupenbiologie der Eulenfalter, die allerdings (aufgrund ihres Gewichtes) bei der Benutzung als Feldführer eine gute körperliche Kondition des Raupenforschers voraussetzt.

R. Gerstmeier

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