



Two recent records from Belgium of established plants of *Fallopia ×conollyana*:

A low profile alien steps into the open

Ivan HOSTE¹, Filip VERLOOVE¹ and John BAILEY²

¹ Botanic Garden Meise, Nieuwelaan 38, B-1860 Meise, Belgium

[ivan.hoste@botanicgardenmeise.be] [filip.verloove@botanicgardenmeise.be]

² Gainsborough Road, Leicester, UK [john.jpb@googlemail.com]

Illustrations: Liliane Tytens (Fig. 1, 4), Ivan Hoste (2), Filip Verloove (3) and John Bailey (5, 6).

ABSTRACT. – In Belgium, the presence of *Fallopia ×conollyana* (*F. japonica* × *F. baldschuanica*) was first confirmed in print in 2007, based on plants cultivated from seed collected from *F. japonica* growing in the wild. In 2016, plants that had established spontaneously in the wild were discovered in Izegem (prov. of West Flanders) and Ghent (prov. of East Flanders). Features that allow recognition of the hybrid are described and illustrated. Some other *Fallopia* hybrids that could also occur are briefly presented as well.

RÉSUMÉ. – Deux observations récentes de *Fallopia ×conollyana* en Belgique: un exotique à bas profil se présente au grand jour. En Belgique, la présence de *Fallopia ×conollyana* (*F. japonica* × *F. baldschuanica*) fut confirmé dans une publication en 2007, basée sur des plantes cultivées à partir de graines recueillies de *F. japonica* croissant dans la nature. En 2016, des exemplaires spontanés et bien développés furent observés à Izegem (prov. Flandre occidentale) et Gand (prov. Flandre orientale). Les caractéristiques qui permettent de reconnaître l'hybride sont décrites et illustrées. D'autres taxons hybrides dans le genre *Fallopia* qui pourraient se manifester sont également brièvement présentés.

SAMENVATTING. – Twee recente waarnemingen van *Fallopia ×conollyana* in België: een low profile exoot treedt uit de schaduw. In België werd de aanwezigheid van *Fallopia ×conollyana* (*F. japonica* × *F. baldschuanica*) voor het eerst in druk bevestigd in 2007, gebaseerd op planten die waren opgekweekt uit zaad afkomstig van in het wild groeiende *F. japonica*. In 2016 werden spontaan in het wild groeiende planten waargenomen in Izegem (prov. West-Vlaanderen) en Gent (prov. Oost-Vlaanderen). Een beknopte beschrijving en illustraties belichten de kenmerken van deze hybride. Enkele andere *Fallopia*-hybriden die mogelijk ook kunnen opduiken, worden eveneens beknopt onder de aandacht gebracht.

Introduction

Fallopia japonica var. *japonica*, originally introduced from Japan in the 19th century, is among the most feared invasive alien plant species in western Europe (Pyšek 2006). That in Europe the plants of var. *japonica* are male-sterile – in this respect differing from the rather rarely cultivated var. *compacta* in which plants can be functionally male or female – hardly seems to slow down its spread by means of vegetative propagation.

Over the past few decades, the arrival and spread of some more taxa of genus *Fallopia*, sometimes hybridizing with *F. japonica*, has resulted in an unintentional hybridisation experiment (Bailey 2013). This puzzle also poses new challenges for invasion ecologists who are trying to predict the consequences such processes may have

for the future impact of *Fallopia* on biodiversity and the functioning of ecosystems invaded by *Fallopia*.

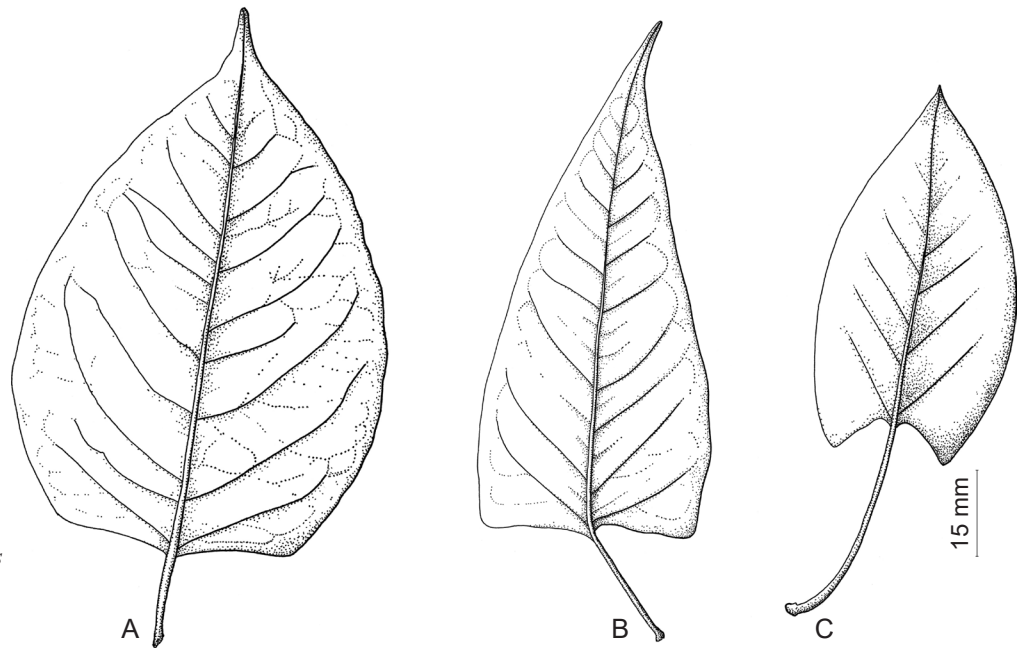
In this paper we briefly describe the features that allow one to recognize *Fallopia ×conollyana* in the field and give an overview of its presence in Belgium. We also add a few words on other *Fallopia* hybrids that also could occur.

Identification of *Fallopia ×conollyana*

Fallopia ×conollyana (*F. japonica* × *F. baldschuanica*)¹ was first discovered in Wales in 1983 as open pollinated seed from *F. japonica*. The description of the hybrid, a few years later, was based on a plant growing near London, in

¹ When the direction of a hybrid is known the convention is to list the female parent first – which in this case is always *F. japonica*.

Figure 1. Leaf shape of *Fallopia ×conollyana* (B) as compared with the parental species *F. japonica* (A) and *F. baldschuanica* (C).



Haringey, Middlesex. After the identity of the hybrid had been established, it became clear that large amounts of seeds produced by *F. japonica* throughout Europe bear *F. ×conollyana* embryos. For some reason, however, only an extremely tiny fraction of these seeds germinate and develop into established plants (Bailey 2001).

Whilst seed of any parentage collected from *F. japonica* in its adventive range will generally germinate quite happily in cultivation, spontaneous germination and establishment in the wild is extremely rare. Seedlings lack the vigour of the parents, are slow to develop and require an open habitat – something not usually available in or around a Knotweed stand. The recent *Hybrid Flora of the British Isles*, for instance, mentions its presence in only 3 hectads in Britain and Ireland, although populations of *F. japonica* with an abundance of *F. ×conollyana* seeds are widespread. In Europe, outside the British Isles, established plants have been recorded in the wild from Germany (Neuwied, Rhineland-Palatinate) and Norway (Adolphs 2015, Stace *et al.* 2015).

That the hybrid between *Fallopia japonica* var. *japonica* and *F. baldschuanica* can develop into a strong, healthy plant is rather surprising: the first species is an erect rhizomatous herbaceous perennial, whereas the second one is a scrambling non-rhizomatous woody liane. Like *F. japonica*, the stems of *F. ×conollyana* die away in winter, with new ones being produced from ground level in the spring. Young plants take a few years before they start producing rhizomes. In habit, the hybrid most closely resembles *F. japonica*, an observation that should come as no surprise since the hybrid contains 4 *japonica* genomes but only one *baldschuanica* one. With its slender stems more strongly bowing over, most people would probably judge the hybrid a more graceful plant than *F. japonica*. This, however, should not seduce gardeners into cultivating it!

Plants often do not flower or start flowering late in the season. Fortunately, the combination of habit and leaf shape is usually sufficient to reliably identify the hybrid (Fig. 1). Still, care should be taken with regrowth of *F. japonica* after mowing or application of weed-killer, as such plants may resemble the hybrid. In *F. ×conollyana* the length of the leaf lamina, which is often more or less triangular in outline, is quite variable, up to 13 cm. The leaves differ from *F. japonica* in usually having a higher length/width ratio and an acuminate to acuminate-cuspidate, not clearly cuspidate, tip. The leaf is most often truncate at the base (as in *F. japonica*) or subcordate. The leaves of *F. baldschuanica* are usually smaller, with a more rounded contour line, a somewhat lower length/width ratio, an obtuse to acuminate tip and cordate base. In *F. ×conollyana* a number of leaves may have an undulate margin (see e.g. Fig. 2A), a feature not uncommon in *F. baldschuanica* either. From a distance, the bright green leaves of *F. ×conollyana* lack the bluish tint that usually characterizes the upper surface of those of *F. japonica* (Fig. 3).

In *F. ×conollyana*, the underside of the leaves is glabrous, a feature in which this taxon differs from *F. sachalinensis*, which furthermore has much larger leaves. *Fallopia ×bohemica* (*F. japonica* × *F. sachalinensis*) too has hairs on the underside of the leaves, but keep in mind that in the hybrid these hairs can be rather inconspicuous. The leaves of *F. ×bohemica* are at least weakly cordate at the base and are usually bigger and wider than in *F. ×conollyana* (Rich & Jermy 1998, Akeroyd 2014).

Identification based on vegetative characters is usually possible, but the presence of flowers provides important additional features. The panicles of *F. ×conollyana* lack the regular long and slender branches that are typical of *F. japonica* (Fig. 2B). The white flowers are somewhat larger and more conspicuous than those of *F. japonica*. They are male-sterile and the number of stamens may be

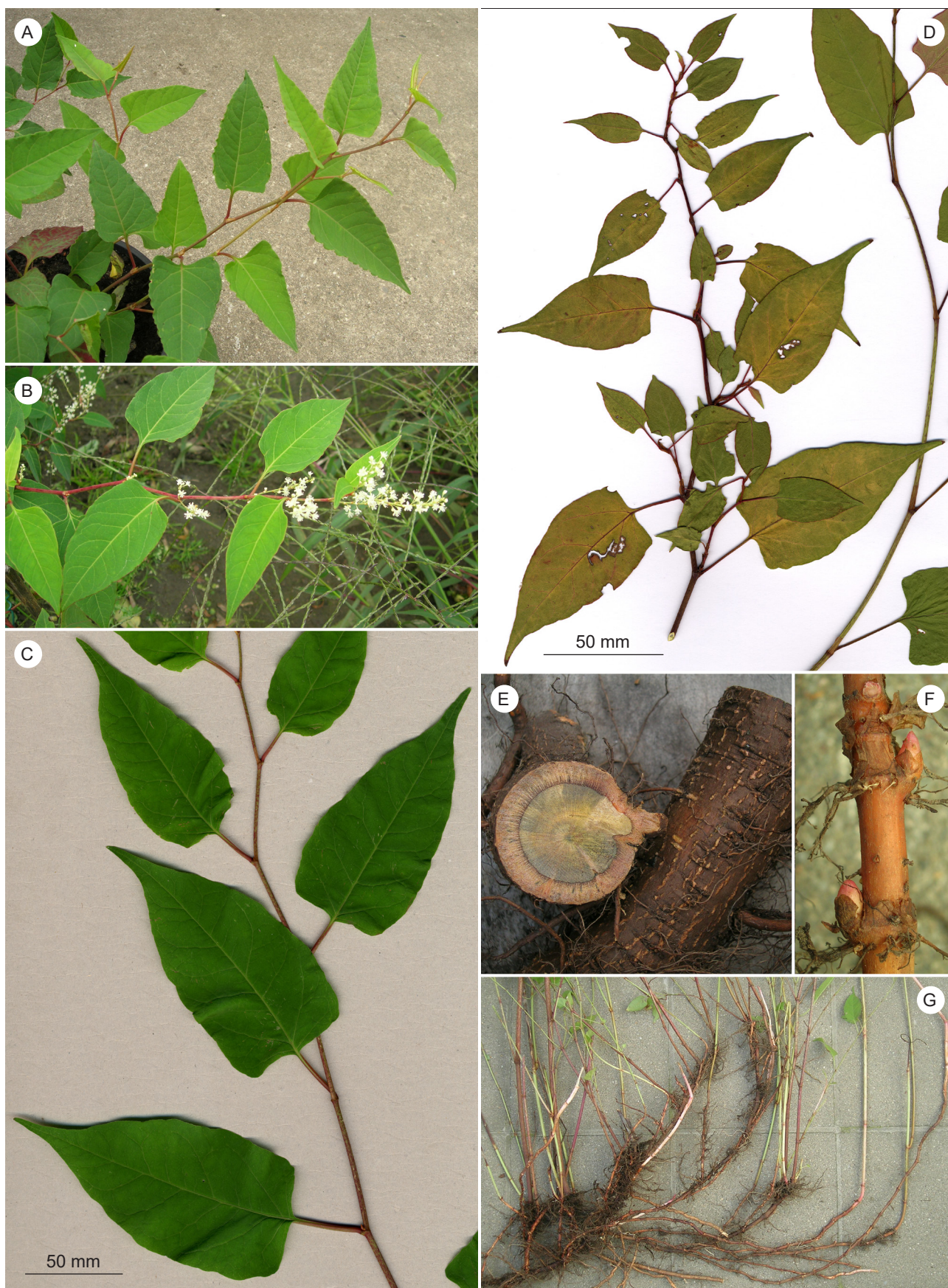


Figure 2. *Fallopia xconollyana* cultivated in a garden, 2009-2015. A: first year plant (20.09.2009); B: flowering plant (03.10.2010); C: shoot with large leaves (10.2014); D: shoot with larger and smaller leaves, from a cutting potted in the autumn of 2014 (10.2015); E: roots, diam. circa 4 cm (23.11.2014); F: rhizome with buds (23.11.2014); G: rhizomes and shoots (28.09.2013).



Figure 3. *Fallopia* *xconollyana* and *F. japonica* growing together in Izezem (prov. West Flanders), 2016. The narrower leaves of the hybrid usually are of a brighter green, without the tinge of blue that is characteristic of *F. japonica*.

reduced, with poorly developed anthers. Whereas in *F. japonica* the flowers have three slender styles with fimbriate stigmas, in the hybrid style length is reduced and stigma more capitate (Fig. 4); in the triploid hybrids the stigmas are even more like those of *F. baldschuanica*.

***Fallopia* *xconollyana* in Belgium**

Experimental researchers were the first to reveal the presence of *Fallopia* *xconollyana* in Belgium (Tiébré *et al.* 2007a, b). Published in scientific journals that are outside the scope of most field botanists who above all gather chorological data on indigenous and exotic plants as part of citizen science projects, this information reached only few potentially interested naturalists.

Driven by curiosity, the first author, who had read the papers by Tiébré *et al.*, collected some seeds for cultivation from a population of *Fallopia japonica* on the banks of the canal Bruges-Ghent, in Lovendegem (prov. East Flanders). About 20 seeds were planted in the spring of 2009 in a pot in a cold greenhouse, and about half of them germinated. Transferred to the garden, one of these plants first flowered late in 2010. A few years later it had started producing numerous rhizomes that gave birth to an increasing number of slender young stalks. In order to prevent the plant from becoming too competitive and troublesome, it was dug out and eradicated in November 2014. A few cuttings, however, were potted and kept as living plants, and in the past two years these have produced less vigorous stems with smaller leaves. (Fig. 2D)

Based on pictures and a chromosome count on material that had been sent to England in 2013, the third au-

thor confirmed that the cultivated plant was indeed *F. xconollyana*, adding in an email that it was much more vigorous than anything he had ever seen. Some months later molecular evidence corroborated the identity of the cultivated plant.

The second author, who had seen pictures of the cultivated plants raised from the seeds collected in Lovendegem, also saw one of the rare British plants of *F. xconollyana* during a botanical excursion in the south of England, at the type locality at an abandoned railway yard at Haringey, London, in the fall of 2015. This gave



Figure 4. Flowers of *Fallopia* *xconollyana*. Drawing based on the plant illustrated in figure 2. The flowers are atypical in having a reduced number of stamens.

him a clear picture of what the fully grown hybrid looked like. Just a few months later, in January 2016, he recorded a well-developed plant in Izegem (prov. West Flanders, IFBL D2.51.41), at a location he knew well and had driven past numerous times without ever noticing the plant. The single plant grew in a crack of the concrete slope of a bridge over a canal, with *F. japonica* var. *japonica* growing immediately next to it (Fig. 3). Its identity was confirmed by the third author, based on photographs.

In October 2016 the second author discovered yet another individual of *F. ×conollyana*, this time alongside a railway track near Ghent (prov. East Flanders, IFBL D3.23.34). Nearby was a massive stand of *F. japonica*. As in Izegem, however, *F. baldschuanica* was not observed in the immediate surroundings.

In December 2015, the first author collected some *Fallopia japonica* seeds for cultivation in an abandoned garden in Aalter (prov. East Flanders), where *F. japonica* probably is a garden relic, as well as *F. sachalinensis* and *Miscanthus sinensis* that were found growing nearby. In 2016, however, the *F. japonica* seeds apparently produced young plants of *F. ×conollyana*, although *F. baldschuanica* was not seen in the vicinity of the disused garden. This indicates that one should always avoid untimely conclusions about the parentage of *F. japonica* seeds based solely on field observations.

Herbarium specimens:

- England: London, Haringay, railway siding, 07.10.2015, *F. Verloove* 11861 (BR).
- Belgium: Izegem, canal Roeselare-Leie (N-side), Centrumbrug (IFBL D2.51.41), talus slope, 17.01.2016, *F. Verloove* 12090 (BR); Izegem, canal Roeselare-Leie (N-side), Centrumbrug (IFBL D2.51.41), talus slope, 03.07.2016, *F. Verloove* 12449 (BR); Gentbrugge (Flora) (IFBL D3.23.34), railway siding, 23.10.2016, *F. Verloove* 12653 (BR).

Epilogue

As long as no well-established plants were recorded, the status of *Fallopia ×conollyana* in Belgium was obscure. Although one could be accused of nitpicking, it is questionable whether the mere presence of seeds is a sufficient reason to add a name to a list of exotic plant species. Most field botanists undoubtedly agree that what counts is a more or less well developed plant, originating from spontaneous germination of involuntarily dispersed seeds or carelessly discarded propagules. Now that well-established plants of *Fallopia ×conollyana* have been found, we hope that more people will look for this hybrid and find the illustrations in this short paper useful. Descriptions of the habitat in which seeds have germinated and established spontaneously can increase our understanding of the hybrid's rarity in the wild (Bailey & Spencer 2003).

At the same time it would be interesting to try to find out the identity of the male parent of seeds gathered from

a large number of *Fallopia japonica* plants. How common are seeds that result from crosses of *F. japonica* with *F. sachalinensis*? And, if common, how viable are they? Answers to these questions can teach us something about the importance of hybrid seeds in the spread of *F. ×bohemica* as compared with vegetative propagation and successful backcrossing with the parent species. For Belgium, several papers on this topic already exist (see Tiébré *et al.* 2007a,b; Saad *et al.* 2011), but the picture is still far from complete. It would also be interesting to know if *F. dumetorum* (indigenous to western Europe) can successfully pollinate *F. japonica*. Trials by the third author to cross *F. convolvulus* with *F. japonica* were not successful.

Citizen science can make a significant contribution by mapping the distribution of all *Fallopia* species, with a special eye to the ratio of male-fertile versus male-sterile populations and the presence of pollen sources in the form of cultivated garden plants. Cultivated plants include *F. japonica* var. *compacta* which – unlike populations of var. *japonica* in western Europe – is often male-fertile (Duis-termaat *et al.* 2012).

In addition to *F. ×conollyana* at the pentaploid level ($2n=54$; *F. japonica* var. *japonica* × *F. baldschuanica*) it has also been produced at the triploid level (Bailey 1989). Open pollinated seed collected from the *F. japonica* var. *compacta* plant growing in the wild at Newbridge (Cornwall) was grown and found to be triploid $2n=32$. This hybrid between *F. japonica* var. *compacta* ($2n=44$) and *F. baldschuanica* ($2n=20$) was grown on and eventually produced flowers. Since it has a ratio of 2:1 Knotweed:Russian Vine genomes, rather than the 4:1 ratio of the pentaploid hybrid, the *F. baldschuanica* features are more obvious in the hybrid flowers (Fig 5).

Seed collected from the tetraploid *F. ×bohemica* from Gomshall, Surrey (*F. japonica* var. *compacta* × *F. sachalinensis*) also proved to be triploid. Finally seed from a female *F. sachalinensis* plant in cultivation in Leicester also produced triploid progeny which flowered in mid December 1985. The flowers again having significant *baldschuanica* influence including a more capitate stigma (Fig. 6). The plants were subsequently grown on outside in the experimental plot, but only produced long unbranched arching stems that were killed by the frost before flowering. Although the less frequent occurrence of the parents in the wild means there is an even smaller chance of such hybrids being found, we include them for the sake of completeness. All the triploid hybrids were perfectly hardy and survived many years outdoors in the UK.

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Figure 5. The triploid hybrid *Fallopia japonica* var. *compacta* × *F. baldschuanica*. This taxon more closely resembles *F. baldschuanica* than the pentaploid hybrid *Fallopia japonica* var. *japonica* × *F. baldschuanica*.



Figure 6. Flowers and young fruits of the hybrid *Fallopia sachalinensis* × *F. baldschuanica*.

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