

Studies in Indian Phyllachoraceae VIII: Some new Species.

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With 7 Figs. in the text.

Since the contributions made by Tilak (1958, 1959) and Ananthanarayanan (1964) to the Indian tar spot fungi, the writer collected a number of Phyllachoraceous fungi from Bombay-Maharashtra and Mysore States, India. Some of these collections on critical examination were found to be new to science and a few others new host records. This paper, eighth in the series, presents six new species of *Phyllachora* and one variety of *Scolecodothis kamatii* Tilak on the basis of comparative morphology, dimensions and host relationship.

Miller (1949), Tilak (1959) and Ananthanarayanan (1964) have observed the association of spermogonia with the developing ascocarps in several species of *Phyllachora* collected by them. The writer also noted the association of such bodies with the developing ascocarps in two of the six species of *Phyllachora* described here, where the writer noticed disintegration of the spermogonia after the development of ascocarps in *Phyllachora symplocicola* sp. nov. on *Simplicoc beddomei* C. B. Clarke and *P. karwarensis* sp. nov. on *Litsea* sp., confirming the results of previous workers regarding the occurrence of spermatization as a common process of sexuality in the genus *Phyllachora*.

However, in none of these cases studied by the writer any conidial stage was found associated as observed recently by Parberry D. G. and R. F. N. Langdon (1963).

The characteristics of the species described here generally agree with the classical description and concept of this historic genus as originally defined by Petrak (1924), Orton (1924, 1944) and Miller (1949) in respect of the internal structure of the ascocarp and its relation to the host tissue.

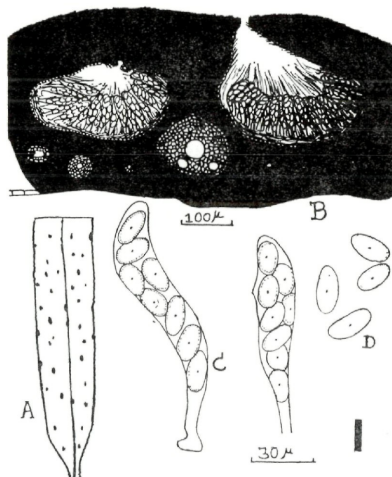
1. *Phyllachora coorgiana* Seshadri sp. nov. (Fig. 1).

Infection spots black, oval, amphigenous, shining, scattered, measuring 0.5–1 mm. Stroma black, cushion-like, with one to two locules in a stroma. Perithecia immersed, flask-shaped, ostiolate, 133,56–177,6 $\times$ 229,44–445,2 μ . Asci cylindrical, octosporous, peri-

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pheral, unitunicate, paraphysate, with a distinct foot, $73,44-114,24 \times 14,8-20,4 \mu$. Ascospores ovate, hyaline, uniseriate, 1-celled, $14,8-20,4 \times 8,16-12,24 \mu$.

Maculae atrae, ovales, amphigenae, nitidae, dispersae, $0,5-1$ mm diam. stromate atro, pulvinato, loculis 1-2 praedito; perithecia omnino immersa, crasse lageniformia, ostiolata, $153,56-177,6 \times 229,44-445,2 \mu$; asci cylindranei vel clavato-cylindranei, tenuiter tunicati, antice vix vel parum, postice paulatim attenuati et breviter stipitati, $73,44-114,24 \times 14,8-20,4 \mu$; sporae mono-vel incomplete distichae, ellipsoideae vel ovoideae, utrinque late rotundatae, continuae, hyalinae $14,8-20,4 \times 8,16-12,24 \mu$.



1. *Phyllachora coorgiana*. A. Habit. B. Section showing ascocarp. C. Asci. D. Ascospores.

Incites tar spots on the living leaves of *Coix aquatica* Roxb. collected by B. N. Muthappa at Coorg, Mysore, India in March 1964. M. A. C. S. Herb. No. 227 (type).

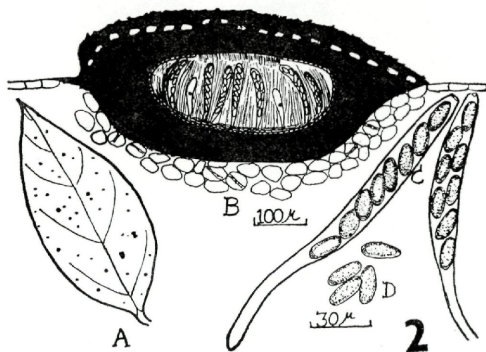
Only a single species viz. *Phyllachora coicis* P. Henn. has been so far reported on *Coix aggregatis*. The Indian species was compared with this species with the following results (vide Table No. I).

P. coicis has been inadequately described and thus a fair comparison is difficult. The Coorg species, however, is characterised by having much longer asci, on the basis of which it is considered new to science.

2. *Phyllachora glochidicola* Seshadri sp. nov. (Fig. 2).

Infection spots epiphyllous, black, shining, scattered, 1—1,5 mm. Stroma black, cushion-like, raised above, convex, uni-loculate with host epidermal cells scattered in the stromatic tissue. Perithecia sub-epidermal, bowl-shaped, with a broad ostiole, $130,0-217,5 \times 290,0-825,6 \mu$. Asci cylindrical with a long pedicel, paraphysate, parallel, in basal layer, octosporous, apical apparatus, a pore, $89,9-151,4 \times 14,8-18,5 \mu$. Ascospores mono- to bi-stichus, 1-celled, hyaline, $18,5-20,35 \times 5,55-9,25 \mu$.

Maculae epiphyllae, nigrae, nitidae, dispersae, 1—1,5 mm diam.; stromate nigro, pulvinato, in epiphyllo plus minusve prominulo et convexo, uniloculato; perithecia immersa, depresso-globosa vel crasse



2. *Phyllachora glochidicola*. A. Habit. B. Section showing ascocarp. C. Asci. D. Ascospores.

lenticularia, ostiolo lato praedita, $130-217,5 \times 290-825,6 \mu$; asci cylindracei, obtusi vel subtruncati, postice in stipitem longum, crassiusculum attenuati, parallele ordinati, paraphysati, tenuiter tunicati, antice poro pertusi, $89,9-151,4 \times 14,8-18,5 \mu$; sporae mono-vel plus minusve distichae, continuae, hyalinae, anguste ellipsoideae, rectae, utrinque vix vel parum attenuatae, obtusae, $18,5-20,35 \times 5,55-9,25 \mu$; episporio crassiusculo, distincte conspicuo.

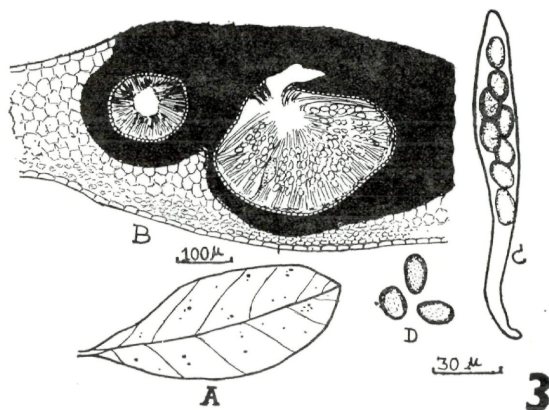
Ineites tar spots on the living leaves of *Glochidion hohenackeri* Bedd., collected by Seshadri, at Matheran, India in January 1964. M. A. C. S. Herb. No. 228 (Type).

Only one species of *Phyllachora* has been so far reported on *Glochidion* sp. and since the Indian species has been collected on a different species of *Glochidion*, a comparative study was undertaken between this and *Phyllachora glochidii* with the following results (vide table No. II).

The Indian species is thus significantly distinct from *P. glochidii* described earlier in respect of nature of perithecia, their apothecia-like structure arising in basal layer, dimensions of asci and bigger ascospores, besides being collected on hitherto unreported species of *Glochidion* and is, therefore, considered new to science.

3. *Phyllachora karwarensis* Seshadri spec. nov. (Fig. 3).

Infection spots epiphyllous, 1—1,5 mm, black, shining, scattered, raised, necrosis develops at the later stages of the infection. Stroma innate, black, cushion-like, 1—2 locules in a stroma. Spermatogonia



3. *Phyllachora karwarensis*. A. Habit. B. Section showing ascocarp. C. Asci. D. Ascospores.

more or less spherical, $118,72-148,4 \times 118,72-178 \mu$. Spermatia minute. Perithecia flask-shaped, rarely round, ostiolate, $178,08-371,0 \times 178,08-281,96 \mu$. Asci cylindrical with a long stalk, peripheral, octosporous, apical apparatus lacking, $122,1-142,45 \times 20,35 \mu$. Ascospores uniseriate, sometimes overlapping, oval, 1-celled, hyaline, $12,21 \times 8,14 \mu$.

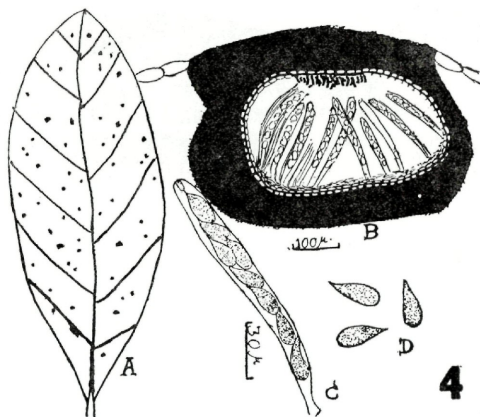
Maculae epiphyllae, 1—1,5 mm diam., nigrae, nitidae, dispersae, prominulae, postea saepe zonula necrotica circumdatae; stromate innato, nigro, pulvinato, 1—2-loculato; spermatogonia plus minusve globosa $118,72-148,4 \times 118,72-178 \mu$; spermatia minuta; perithecia ellipsoidea vel subglobosa, saepe plus minusve irregularia, ostiolata, $178,08-371 \times 178,08-281,96 \mu$; asci cylindracei, utrinque plus minusve attenuati, tunc subfusoidi, postice in stipitem longiusculum attenuati, octospori, tenuiter tunicati, $122,1-142,45 \times 20,35 \mu$;

sporae mono-vel incomplete distichae, ellipsoideae vel ovoideae, utrinque late rotundatae, continuae, hyalinae, $12,21 \times 8,14 \mu$.

Incites tar spots on the living leaves of *Litsea* sp. collected by Seshadri at Karwar, Mysore, India in November 1963, M. A. C. S. Herb. No. 229 (Type).

4. *Phyllachora litseicola* Seshadri spec. nov. (Fig. 4).

Infection spots amphigenous, black, irregular, scattered, 1 mm. Stroma amphigenous, black, cushion-like, multi-loculate, 6 in a stroma. Perithecia bowl-shaped, immersed, with a broad ostiole, $159,5-290 \times 188,5-449,5 \mu$. Asci octosporous, cylindrical, unituni-



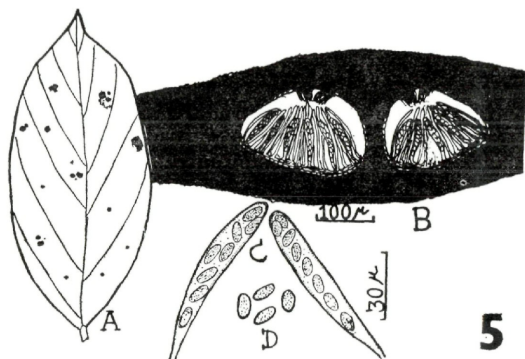
4. *Phyllachora litseicola*. A. Habit. B. Section showing ascocarp. C. Asci. D. Ascospores.

cate, prallel in basal layer, apical apparatus present, $148,0-159,1 \times 7,4-9,25 \mu$. Ascospores uniseriate, hyaline, 1-celled, oblong to elliptical, with a prominently pointed tip, $18,5-22,2 \times 7,4 \mu$.

Maculae amphigenae, nigrae, irregulares, dispersae, 1 mm diam.; stromate amphigeno, nigro, pulvinato, pluri-plerumque sexloculato; perithecia subglobosa vel late ellipsoidea, plus minusve depressa, omnino innata, ostiolo crassiusculo praedita, $159,5-290 \times 188,5-449,5 \mu$; asci cylindracei, tenuiter tunicati, in peritheciis basi parallele ordinati, $148-159,1 \times 7,4-9,25 \mu$; sporae monostichae, hyalinae, continuae, oblongae vel ellipsoideae, rectae, postice late rotundatae, antice paulatim attenuatae et acuminatae, plasmate minute granuloso farctae, $18,5-22,2 \times 7,4 \mu$.

Incites tar spots on living leaves of *Litsea stocksii* Hk., collected at Mahabaleshwar in November 1963 by Seshadri, M. A. C. S., Herb. No. 230 (Type).

Five species of *Phyllachora* have so far been reported on species of *Litsea*. Since these two species have been collected on different species of *Litsea*, a critical comparative study was carried out which showed that the two Indian species not only differed among themselves significantly in all essential characters but also from the previously described species on *Litsea* sp. and hence have been described as new to science.



5. *Phyllachora mysorensis*. A. Habit. B. Section showing ascocarp. C. Asci. D. Ascospores.

5. *Phyllachora mysorensis* Seshadri spec. nov. (Fig. 5).

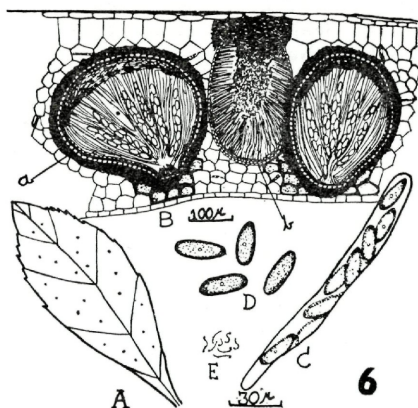
Infection spots amphigenous, black, shining, irregular in outline, scattered, later forming a necrotic area around the spots. Stroma immersed, cushion-like, multi-loculate, 2–6 to a stroma. Perithecia more or less spherical, ostiolate, opening on the upper surface of the leaf, $200-300 \times 222-433 \mu$. Asci numerous, paraphysate, octosporous, unitunicate, apical apparatus lacking, $67,6-77,7 \times 7,4 \mu$. Ascospores hyaline, 1-celled, elliptical, monostichus, $11,1-13,95 \times 3,7-5,55 \mu$.

Maculae amphigenae, nigrae, nitidae, irregulares, dispersae, postea plerumque zonula necrotica circumdatae; stromate innato, pulvinato, pluri-plerumque 2–6 loculato; perithecia plus minusve globosa, ostiolata, $200-300 \times 222-423 \mu$; asci numerosi cylindracei, utrinque vix vel parum attenuati, tunc subclavati, subsessiles vel brevissime stipitati, tenuiter tunicati, $67,6-77,7 \times 7,4 \mu$; sporae monostichae, ellipsoideae, continuae, hyalinae, $11,1-12,25 \times 3,7-5,55 \mu$.

Incites tar spots on living leaves of *Connarus monocarpus* L. collected by Seshadri at Karwar, Mysore, India in November 1963. M. A. C. S. Herb. No. 231 (Type).

Phyllachora connari Syd. and *Phyllachora connarina* Reib., have been previously described on two undetermined species of *Connarus*. Since the Indian species has been collected on a different species of *Connarus*, the writer's collection was critically compared with the other two species of *Phyllachora* (Vide Table No. III).

A careful study of the above table would show that the Indian species is significantly distinct from the two previously described species in respect of measurements of the asci, perithecia, and ascospores and even in habit, having very few locules to a stroma; besides being collected on a hitherto unreported host and hence has been accommodated as new to science.



6. *Phyllachora symplocicola*. A. Habit. B. Section showing ascocarp. C. Asci. D. Ascospores.

6. *Phyllachora symplocicola* Seshadri spec. nov. (Fig. 6).

Infection spots amphigenous, with a yellow halo on the upper surface of the leaf when young, turning to black at maturity. Spermatia more or less, spherical or flask-shaped, ostiolate, opening on the upper surface of the leaf, $159,5-290,0 \times 216-290 \mu$. Spermatia numerous, borne on the thread-like spermatophores, lining the entire cavity, spermatia spiral with a bulbous tip. Perithecia flask-shaped, 1-4 to an infection spot, deeply embedded, ostiolate, opening on the

lower surface of the leaf, $145-290 \times 106-348 \mu$. Asci paraphysate, cylindrical, octosporous, apical apparatus lacking, unitunicate, $166,5-198,7 \times 10,1 \mu$. Ascospores one-celled, hyaline, elliptical, uniseriate, $18,5-25,9 \times 7,4-9,25 \mu$.

Maculae amphigenae, primum in epiphylo zonula flavida circumdatae, in maturitate nigrae; spermogonia in epiphylo, $159,5-290 \times 216-290 \mu$; spermata numerosa in spermatophoris filiformibus orta; spermata spiraliter curvula, antice bulbiformiter incrassata; perithecia in hypophyllo evoluta, ovoidea, 1-4 in quoque macula, omnino immersa, ostiolata, $145-290 \times 106-348 \mu$; asci cylindracei, antice rotundati, postice parum attenuati, subsessiles vel brevissime stipitati, tenuiter tunicati, $166,5-198,7 \times 10,1 \mu$; sporae monostichae, anguste ellipsoideae vel breviter cylindraceae, utrinque vix vel parum attenuatae, obtusae, rectae, continuae, hyalinae, $18,5-25,9 \times 7,4-9,25 \mu$.

Incites tar spots on living leaves of *Symplocos beddomei* C. B. Clarke, collected by Seshadri at Mahabaleshwar, during January 1964. M. A. C. S. Herb. No. 232 (Type).

Phyllachora symploci Pat. has been recently reported from India by Ananthanarayanan (1964) on this host. Since, however, this collection showed distinctive habit and macroscopic characters a comparative study was undertaken between the two species (Vide Table IV).

The writer's collection is characterised by the presence of spermogonia, flask-shaped perithecia, distinctive habit and significantly longer and thinner asci besides extremely small perithecia. The arrangement of the asci within the perithecium has a different pattern than that found in *P. simplici* pat., where they are in parallel rows. On the basis of these distinctive morphological characters and internal structure of the ascocarp this species is described as new to science.

7. *Scolecodothis kamatii* var. *macrospora* var. nov. Seshadri Fig. 7.

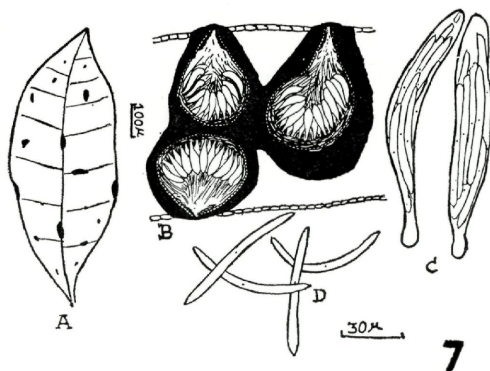
Infection spots amphigenous, irregular, scattered, black, upto 1 mm. broad. Stroma amphigenous, cushion like, upto 20 locules in a stroma. Perithecia spherical to flask shaped, immersed, ostiolate, opening on both the sides of the leaf, $222,6-296,8 \times 148,4-281,96 \mu$. Asci cylindrical to clavate, pedicellate, octosporous, apical apparatus present, $89,54-113,96 \times 12,21-16,28 \mu$. Ascospores scolecosporic, narrowly cylindrical, single celled $61,05-73,26 \times 4,07 \mu$.

Maculae amphigenae, irregulares, dispersae, nigrae, usque ad 1 mm diam.; stromate amphigeno, pulverulento usque 20-loculato; perithecia ovoidea vel subglobosa, immersa, ostiolata, $222,6-296,8 \times 148,4-281,96 \mu$; asci cylindracei vel cylindraceo-clavati, antice late

rotundati, vix vel parum, postice paulatim vel abruptiuscule attenuati, breviter stipitati, tenuiter tunicati, $29,54-113,96 \times 12,21-16,28 \mu$; sporae breviter et crassiuscule filiformes vel tenuiter cylindraceae, utrinque vix vel parum attenuatae, obtusiusculae vel subacuminatae, hyalinae, continuae, $61,05-73,26 \times 4,07 \mu$.

Incites tar spots on *Cryptolepis buchmani* R. and S. collected by Seshadri at Sinhagad near Poona, India. M. A. C. S. Herb. No. 233 (Type).

Scolecodothis kamatii Tilak has been described on *Cryptolepis buchmani* R. & S., of the family Asclepiadaceae from India and since the present collection, though collected on the same host, shows distinct differences in all respects and hence a careful comparison was made with the following results (Vide Table V):



7. *Scolecodothis kamatii* var. *macrospora*. A. Habit. B. Section showing ascocarp. C. Asci. D. Ascospores.

It is clear from the above table that the writer's collection differs significantly from *S. kamatii* Tilak in all respects as well as in multi-loculate character of the stroma and also in the measurements of asci and ascospores and therefore, has been described as a new variety.

All the materials have been deposited in Mycological Institute Kew, England and in Mycological Herbarium New Delhi, India, besides M. A. C. S.

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Table I.

Comparison between the species of <i>Phyllachora</i> affecting species of <i>Coix</i> .						
Species	Host	Stroma	Perithecia	Asci	Ascospores	
<i>P. coicis</i> P. Henn.	<i>C. aggregatis</i> Lour.	Strieformis	Immersed.	50—70 × 15—20 μ	16—22 × 11,14 μ	
<i>P. coorgiana</i>	<i>C. aquatica</i> Roxb.	One totwo locules	Immersed, flask-shaped 133,56—177,6 × 279,4—445,2 μ	73,44—114,24 × 14,8—20,4 μ	14,8—20,4 × 8,16—12,24 μ	

Table II.

Species	Stroma	Perithecia	Asci	Ascospores
<i>P. glochidii</i> Syd.	—	Single	Cylindrical, 69—90 × 9—13 μ	Obliquely monostichus, 14,16 × 5—7 μ
<i>P. glochidicola</i>	Uniloculate	Bowl-shaped, 130—217,5 × 290—825,6 μ	Cylindrical with a long pedicel, apical apparatus present, 90,0—151,4 × 14,8—18,5 μ	Mono to bi-stichus, 18,5—20,35 × 5,55—9,25 μ

Table III.

Comparison between species of <i>Phyllachora</i> affecting <i>Connarus</i> sp.						
Species	Host	Infection spot	Stroma	Perithecia	Asci	Ascospores
<i>P. connari</i> Syd.	<i>Connarus</i> sp.	Scattered, conspicuous, minute, spherical, 1—3 mm	Globose, 10—40 locules	—	Cylindrical to clavate, 70—80 × 10—13 μ	Oblique, monostichus some times distichus, 16—18 × 3,5 μ
<i>P. connarina</i> , Rieb.	<i>Connarus</i> sp.	Round to polygonal, 2—3 mm	Depressed, 8—20 locules	Opening on under surface 100—125 μ	Cylindrical, 86—95 × 6 μ	Ellipsoid monostichus, 6—7 × 3 μ
<i>P. mysorensis</i>	<i>Connarus</i> mono. <i>carpus</i> L.	Amphigenous	Immersed, 2—6 locules	Opening on the upper surface, 200—300 × 222—433 μ	Cylindrical, 67,6—77,7 × 7,4 μ	Elliptical monostichus, 11,1—13,9 × 3,7—5,55 μ

Table IV.

Comparison between species of *Phyllachora* affecting *Symplocos beddomei* C. B. Clarke.

Species	Infection	Spermagonia	Stroma	Perithecia	Asci	Ascospores
<i>P. simploti</i> pat.	spot Epiphyllous in beaded circles	Absent	Epiphyllous	Bowl-shaped, hemispherical, 637—728 μ	Parallel in basal layers, 86,0—99 $\times$ 15—17,2 μ	21,5—22,5 $\times$ 8,6—9,6 μ
<i>P. symplocicola</i>	Amphigenous, with yellow halo on the upper surface	Ostiolate, 159,5—290 $\times$ 216—290 μ	Endophyllous.	Flask-shaped, 145—290 $\times$ 106—348 μ	Peripheral, 166,5—198,7 $\times$ 10,1 μ	18,5—25,9 $\times$ 7,4—9,25 μ

Table V.

Species	Stroma	Perithecia	Asci	Ascospore
<i>S. kamatii</i> Tilak	Single locule in a stroma	187—225 $\times$ 119—170 μ	80—88 $\times$ 12—15 μ	51,57 $\times$ 3—5,5 μ
<i>S. kamatii</i> var. <i>macrospora</i>	Upto 20 locules in a stroma	222,6—296,8 $\times$ 148,4—281,96 μ	89,54—113,96 $\times$ 12,21—16,28 μ	61,05—73,26 $\times$ 4,07 μ

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