SPURIOUS BIASTREPSIS IN TAXUS BACCATA

by

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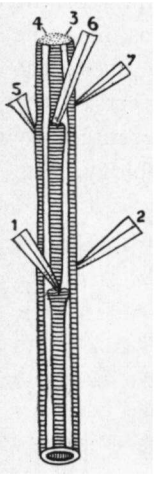
With tab. IV and 7 textfigures.

January 1927 Mr. P. J. Schenk, Technical Advisor 1st class of the Phytopathological Service, was so kind as to send me a dozen of branches of *Taxus baccata L.*, in which a great deal of „big bud"[1]) was shown, caused by a mite known as *Eriophyes psilaspis*. „From these infected buds" says Mr. Schenk in an accompanying letter, commonly grow a quantity of poor sprigs, which turn about, but I am not prepared to look at the present *long, strongly twisted* branches as the outcome of the attack of mites. Do you think it is biastrepsis?"

An examination of this abnormality, also in loco, showed in the first place that the shoots are twisted either to the right or to the left, an alternative which is also observed in the normal arrangement of the needles. Secondly it is evident from the locality of the disturbance and a transverse section of an affected shoot that the abnormal branches were all of them produced in 1926 and consequently the disturbance cannot have been observed here on such a large scale till the above named year. In the third place it deserves attention that apart from the torsion the affected shoots are strongly bent and curved in an irregular way

[1]) Ziekten en beschadigingen der Tuinbouwgewassen 1 B door M. van den Broek en P. J. Schenk, 4e druk 1925, p. 183. Also several volumes of „Tijdschrift over plantenziekten" onder redactie van Prof. Dr. J. Ritzema Bos.

(Fig. 1 and 2). So the general aspect of this „yellowish" yewtree, as Mr. Schenk puts it, is very abnormal. Several authorities, scientific and practical, state that they have never seen a serious disturbance like this in Taxus or some other Coniferous plant.



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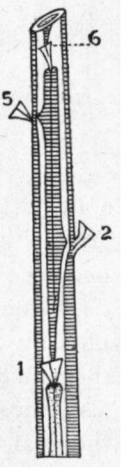
In order to give an idea of the said monstrosity it is necessary first to examine the normal stem and its relation with the leaves or needles i.c. the way of their insertion. In Fig. 3, which shows the phyllotaxis in a primary shoot, we observe that the spiral runs up from the left hand to the right and that a leaf consists of three portions: *a*) a narrow green strip grown together with the stem: the *leafbase, b*) a thin *petiole, c*) the *lamina* or needle proper. The leafbase deserves our special attention as it connects the whole series of superposed leaves and seems to throw some light on the origin of the leaves generally appearing from the surface of the stem. Looked at in their lateral relation the leaf-bases show a *complete independence* of one another. At the top the leaf-base is notched and somewhat broadened, downwards it gets thinner and tapers until it has come very near a lower leaf. A striking fact is that each leafbase sends out from its two margins a short lateral excrescence opposite the leaves 2 and 5 (Fig. 4), apparently preventing any contact with these on account of a rather thick membrane of cutin. The five leaf-bases being alike it is beyond doubt that the five rows of leaves are — in normal circumstances — kept at a distance from one another all along the stem and the branches. Another thing worth mentioning is that the needles are somewhat condensed



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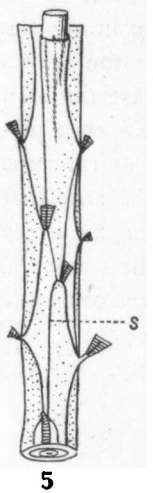
into groups in some varieties whereas in other ones they are more regularly distributed along the stem and the branches and also that in the adult shoots of Taxus the needles are arranged *biserially* through the twining of the petioles i.e. have become two-farious. When, as in some cases, this twining does not show itself, the sprout or part of it is said to revert to the *juvenile* arrangement, as is represented by Masters, p. 110, Vegetable Teratology, Fig. 43. (German Translation) That the leaf-bases remain thoroughly unconnected, also in the following years, is shown in Fig. 5. Here the said bases have actually broadened but have been arrested in their growth by narrow stripes of cork (S) replacing the epidermis of the first year. In the third year the independence of each base has become still more marked as is shown in Fig. 6: the thin corkline has developed so strongly now as to split up the inferior portion of each leaf-base. And although the surface of the latter has also become brown it differs from cork not only by its glittering surface but also by a great quantity of tiny dots as is seen in the figure. Moreover their margins strongly project and in a less degree also the median rib. Also in this transformation the leaf-bases, although perfectly useless now, remain visible for many years, especially their top crowned by the rest of the needle. Not till the stem is rather old the last remains disappear and a homogeneous mantle of cork covers the whole surface.



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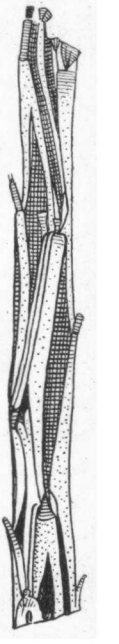
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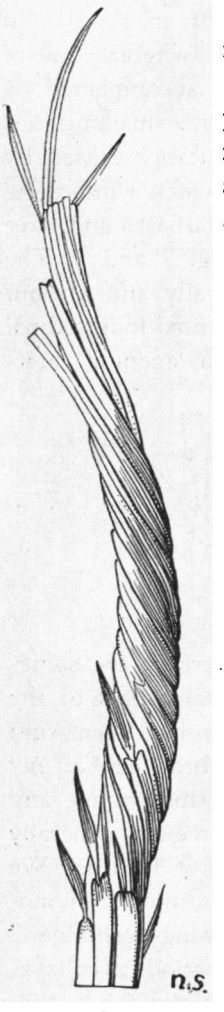
So much about the normal process of growth in Taxus baccata in all its varieties; let us pass now to the abnormal

phenomena of curvation and torsion which have been noticed in the nurseries of Mr. Jac. Smits at Naarden.



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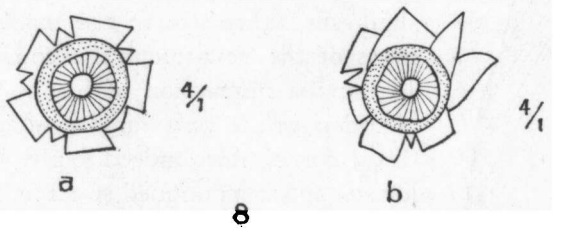
This gentleman was so kind as to admit me to his well known grounds on April 12 in company of Mr. Schenk. Two phenomena struck me at first sight: the irregularity of the ramification i.e. the alternating twisted and normal shoots and secondly the great quantity of globular buds indicating the presence and the activity of Eriophyes. After this visit I have directed my special attention to Taxus in several gardens at Hilversum and elsewhere but never come across the slightest disturbance in the many specimens of the Yew-tree in this country. So I keep the impression of having been at Naarden in the very Paradise of a special disturbance known indeed to phytopathologists but unmentioned so far as I know in teratological literature.

Having been put in possession of a good many affected pieces of which Mr. Schenk has been kind enough to photograph a couple (Fig. 1 and 2), I beg to draw attention to the following facts: 1° that the basal portion, correspon- ding with the growth of 1925, is absolutely normal, 2° that the shoots of 1926 are *swollen* at the base and for the rest very irregularly *bent* and *curved* in several directions. Fig. 1 represents a very long main shoot and a lateral branch of which only $^1/_5$ is visible on the plate. Both are twisted to the left and the number of needles at the top-end is much

greater than on the basal portion. On the other hand the leaf-bases are extraordinarily long in the inferior, larger portion as is shown more distinctly in Fig. 7. In Fig. 2 the terminal shoot is rather short, whereas one of the branches is more developed and even accompanied by an additional branch a little lower. Of the smaller twigs several bear a globular bud at top indubitably caused by Eriophyes. The strongly projecting ribs, which wind along the boughs are the *united margins* of the leafbases and have a considerable length as is shown in Fig. 7 and 9. The surface of such a long leafbase is generally smooth but here and there undulating, suggesting a stunted longitudinal growth and somewhat reminding one of a creeping cater



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pillar. The needles, although commonly green, are somewhat yellow or brown. Such is the general aspect of the young yewtrees of which Mr. Jac. Smits has been kind enough to put a sufficient number of branches at my disposal for examination. How to explain this strange and as yet unmentioned phenomenon in a tree so generally cultivated in Holland and other countries of Europe? We think, of course, in the first place of the admirable monography of Prof. Hugo de Vries on „Zwangsdrehungen" now reprinted in Vol. V of his „Opera e periodicis collata" and published as early as 1891. In this paper the author has pointed out the difference between Real biastrepsis (Zwangsdrehungen) and Spurious biastrepsis (several cases of torsion), the former occurring exclusively in plants with

verticillate and decussate leaves, the latter only in plants with an alternate arrangement of the leaves.

The leaves being alternate in Taxus ($^2/_5$) our case is to be classed with what de Vries calls: spurious biastrepsis. Two questions arise: how has the torsion come about? by what cause have the leaf-bases grown together? One of these processes must have been primary. In my opinion it is hardly possible that inside the leafbud a torsion could arise and if so, strong enough to bring the leaves together and make them coalesce. It is far more probable that the young leaves in their very tender state in which neither an epiderm nor the projecting points of Fig. 4 could be developed, join their tender margins and so cause the torsion as soon as the internodes stretch beyond the bud.

$^2/_1$

That the coalescing leaf-bases are much longer than the normal ones is a fact of additional interest; it only proves that the growth has been very intense, another consequence perhaps of the influence of a parasite.

That the abnormality described in these pages has as yet not been mentioned in the teratological literature may find its explanation in the fact that in a nursery with its great variety of cultivated plants the chance of infection is so much greater than in forests or plantations of the same plants i.c. Coniferae where hundreds and thousands of the same species grow in company and only small herbs cover the bottom.

Finally I beg to draw the attention of the phytopathologists to the related facts and to induce them to take experiments on the infection of Taxus and other Coniferae with Eriophyes and similar mites.

List of the figures.

Fig. 1. Normal stem (1925) from the top of which spring two shoots (1926) showing torsion to the left, ½. (Tab. IV).

Fig. 2. Id. id. grown out in 1926 to main shoot which produces two lateral boughs, all of these with torsion to the left. Another, lower, branch without torsion, ½. (Tab. IV).

Fig. 3. Arrangement of the leaves: $^2/_5$.

Fig. 4. Id. The basal portion of the leaf, which unites two superposed needles 1 and 6, shows two prominent points opposing the leaves 2 and 5 but not in any contact with these.

Fig. 5. In the second year the basal portion (dotted) is broadened but separate through a thin layer of cork (S).

Fig. 6. In the third year this layer of cork occupies on account of the increased circumference of the stem a greater surface and tears up the basal portion of the leaf-bases.

Fig. 7. Strong torsion, the majority of leaves fallen. The whole sprout, of which our figure represents the basal portion only, is bent to and fro and is 3.5 dm. long nat. size.

Fig. 8. Section of a branch of one year, *a*) normal, *b*) partly twisted, 4/1.

Fig. 9. Top of a twisted bough 2/1. Torsion decreasing.


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