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**ENHANCEMENT OF THE BOTANICAL MICRO-SLIDE LIBRARY  
OF PHILIPPE VAN TIEGHEM AT THE HERBARIUM OF PARIS (P):  
HISTORICAL SIGNIFICANCE, RESTORATION AND PROSPECTS**

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Mainly based on dried herbarium specimens, micro-slide libraries provide good evidence of the advances in anatomical knowledge – especially of vascular plants –, the botanical heritage that might be productively re-examined in the light of new approaches.

Here we illustrate the case of the collection gathered by Philippe Van Tieghem (1839–1914), tightly linked to the herbarium sheets, and a primary source for phytomorphologic as well as monographic studies (especially in *Loranthaceae* s.l. and *Ochnaceae*).

After more than 70 sleeping years, this micro-slide library is involved in an enhancement process, in order to improve the availability of its histological data to the botanical community. Some technical problems encountered in restoration, literature, iconography, as well as research prospects are here addressed.

*Keywords:* history of botany, microscopy, museology, plant anatomy

Since the 19<sup>th</sup> century micro-slide libraries were often built up in institutional herbaria, and even in some large private ones. Mainly based on dried specimens, they provide good evidence of the advances in the anatomical knowledge – especially of vascular plants –, botanical heritage that might be productively re-examined in current research, possibly by new observation techniques.

Unfortunately, many of these collections were further neglected, forgotten, or even destroyed (e.g. Agnès Arber's slide library) during the second half of the last century [10], as a result of a relative disinterest for comparative anatomical studies.

Here we consider the collection of Philippe Van Tieghem (ca. 20,000 slides, i.e. 26 % of the whole slide library at P), mounted between 1875 and 1914, which is tightly linked to the herbarium sheets – including historical herbaria – and was the primary source for phytomorphological (plant symmetry, organography, floral anatomy) as well as monographic studies (especially in *Loranthaceae* s.l. and *Ochnaceae*).

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#### **Biographical sketch**

Philippe Van Tieghem (Fig. 1, 1), after firm studies in mathematics and physics, became a disciple of Louis Pasteur in 1858, and was thus experienced in methods of the budding science of microbiology. During his career he kept an interest in spores and pollen grains cultivation, as well as in experimental studies. He was also influenced by Pasteur's ideas about molecular symmetry (and dissymmetry evolving from biological processes), conceived in a more mineralogical scope as outlined by Bonnier [2]. Thus he applied them between 1867 and 1869 [3, 4] for improving the anatomical definition of the main “organs” (or rather “parts”) of vascular plants, i.e. root, stem

and leaf, by using geometrical features such as axial vs. bilateral symmetry, and primary xylem arrangement and differentiation [6]. He then introduced these in his translation and adaptation of the classical work of Sachs and, a few years later, applied these concepts to flower interpretation and developed them further in his own treatise [12]. This translating – critical yet – activity from German to French language played a crucial role in encouraging botanical research in France during the 19<sup>th</sup> century, as emphasized by Vallade [11].

#### **Hindrances to the spread of Van Tieghem's works**

Despite the tremendous number (350) of his published papers between 1863 and 1912, it is astonishing that so few citations were made to them in the worldwide botanical literature. For example, he is scarcely cited in the classical treatise *Anatomy of the Dicotyledons* by Metcalfe and Chalk [8], and not at all for the *Ochnaceae* family, in which he described yet 59 new genera by using anatomical features, and a peculiar tissue reflective the light excess: the cristarque [9, 13]. He is also strikingly absent of a recently published book about history of botany [7].

The first reason was given as early as 1914 by Bonnier [2]: the definitive look of Van Tieghem's papers showing detailed classifications with curly brackets, a misleading impression as we e.g. found at the library of P a printed copy of his "Ochnacées" [14] annotated by Van Tieghem himself in pencil with a view of preparing a revised work. That is strengthened by obvious changes in names written in some labels: the slide library was indeed a living research tool.

The second reason is the literary turn of the mind of the papers, wholly written in French (even generic names were gallicized) and devoid of a short abstract. The lack of any index, both for the scientific names, new technical terms and the numerous examined specimens, is much awkward, especially when a paper is long (more than 400 p. in [14]). Retrieval of data is discouraged if the reader is moreover convinced the reference slide library is no more accessible.

The third reason is, undoubtedly, the most serious one in anatomical studies: illustrations (drawn plates or photographs) are missing in most of Van Tieghem's papers. Thus, the only firm basis of all these studies is the slide library itself, the available information depending on the present condition of this collection, which existence and the place of storage have been never clearly given.

#### **Restoration schedule**

All slides (7.5 (infrequently 7.1) x 2.5 cm) lay on wooden trays (Figure 1, 2) crowded in 3 glass-fronted cupboards: 2 tall ones (each with 3 columns of 100 trays) and 1 low one (2 x 36), and 2 middle-sized pieces of furniture (each 2 x 90). Each tray might contain ca. 36 slides. So the whole potential capacity is 30,672 slides, and 2/3 of this volume is truly used, due to taxonomical separations (only one family on a tray, sometimes with few slides) and occurrence of some empty trays. The Van Tieghem's collection was kept since 1914 in the slide library of the Laboratoire d'Organographie végétale of the Museum of Paris (southern side of Buffon Street) which, after the last revision by Prof. André Guillaumin, moved in 1942 to the northern side in the Herbarium building [1], at the 4<sup>th</sup> floor (western side). At this level, several other additional collections were arranged, especially specimens in spirit ("Alcoothèque"), fruits and seeds ("Carpothèque"), and later also some separate herbaria, books, and manuscripts. Located in a badly lit room, devoid of a table with a microscope, and even without a catalogue (probably lost), Van Tieghem's mountings were hardly usable and scarcely consulted, especially since the end of the 1980's. During the renewal works of the Herbarium, the furniture was moved three times (in 2000, 2003, and 2010) and put at the underground level, the 2<sup>nd</sup> floor, and at last the 4<sup>th</sup> floor (eastern side), so we could check its strength and the amazing good condition of the slides (Figure 1, 2–5). All of them indeed are firmly labelled at least with a Latin name and sectioned organ information, very often

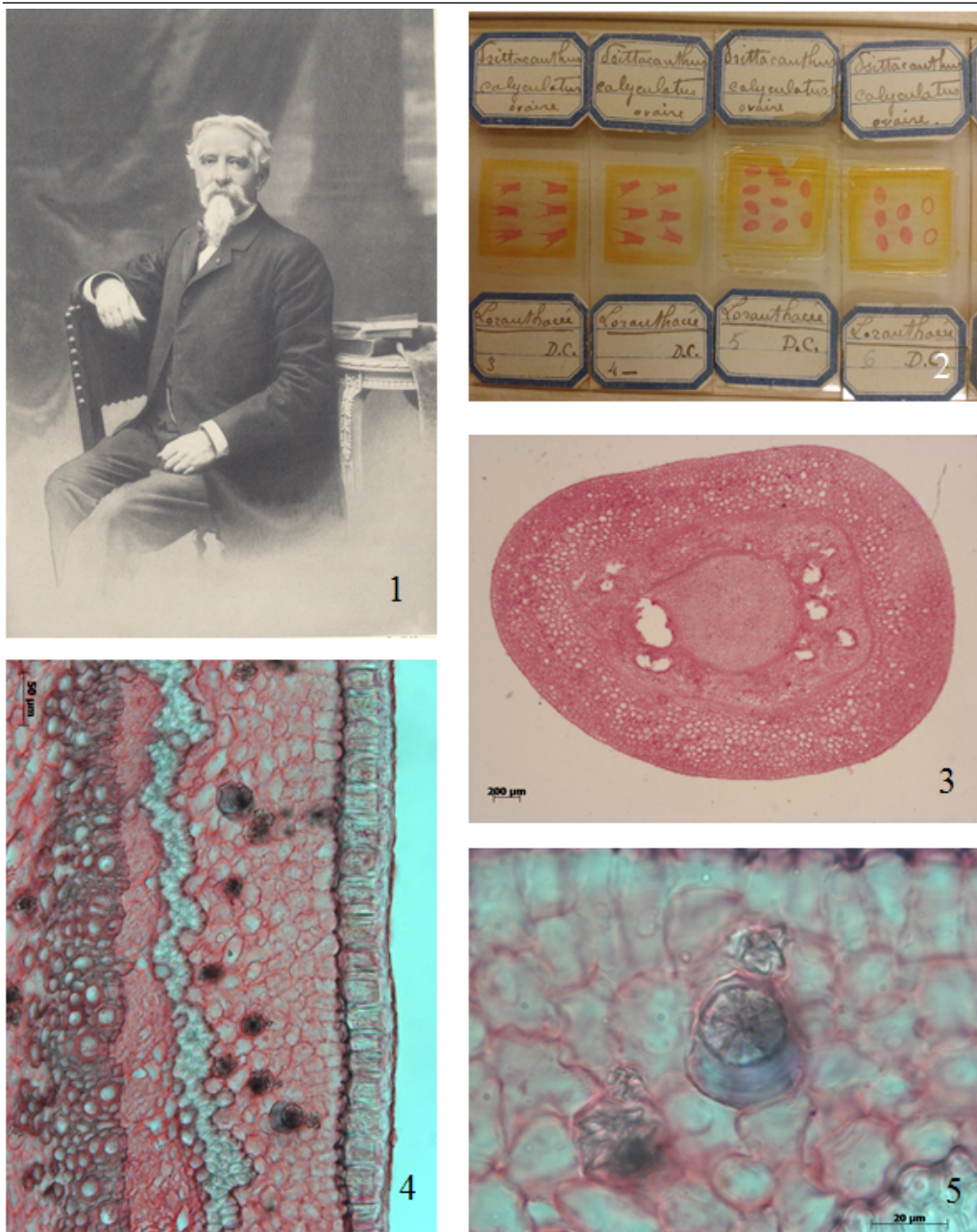


Fig. 1. Details of the Van Tieghem's slide library: 1 – Philippe Van Tieghem; 2 – Some restored slides (seriate sections of ovary in *Psittacanthus calyculatus* G.Don , *Loranthaceae*; 3 – Ovary transverse section of *Psittacanthus robustus* (Mart.) Marloth, *Glaziou 13456*, Brazil [P05456327]; 4 – Transverse section of the leaf adaxial side of *Ouratea pycnostachys* Engl., *Martius 1330*, Brazil [P00542413], *Ochnaceae*, showing the cristarque tissue sparse in the parenchyma; 5 – Detail of a cristarque cell, showing the calcium oxalate druse and its thickened lignified inner wall

with sheet references. Types were quoted, when described prior to Van Tieghem's studies. Very little damage has been reported until now (1/3 of restoration work made): less than 0.5 %, and broken slides may be almost always stuck back together again, by using a Cyanolit® glue for the glass pieces and sometimes syrupy Canada balsam at the coverslip level. Beyond 2 pieces, it is of course better to stick them on a thin glass slide, and to harden the whole in a drying oven at 45 °C. The main problem we met in cleaning is the somewhat greasy layer of dust, variable in its thickness, and due to coal particles (old heating systems, and most probably the vicinity of the great railway station of Paris-Austerlitz). Good results are obtained with a simple method (paper handkerchief, with mouth-produced steam, as for spectacles), better ones with a window-cleaning product (towel, easy here with well-glued, Indian ink written labels). Trays are hardly untidy, and the labels allow the right order of slides to be found easily.

During the cleaning process, we checked some mountings: almost all are permanent ones in Canada balsam. Very few slides (c. 0.2 %) were temporary – coverslips and specimens often missing – and cannot be recovered. Anatomical schedule appears constant: sections were made with a hand microtome, soaked in sodium hypochlorite, stained by alum carmine and iodine green, then dehydrated and mounted in balsam. As previously described for other old slides [5], Canada balsam turned yellow, while iodine green most often faded and disappeared, but well-preserved in some cases (Figure 1, 4 and 5). Sections are yet exploitable by examining and photographing them, especially under peculiar lighting, such as polarized light.

#### Prospective conclusion

Thus it is possible yet to restore a detailed catalogue of mountings, which might be useful in a printed form, parallel to a check in the literature, in order to prepare the data capture and the link with extant databases (e.g. Sonnerat for the P herbarium). This preliminary stage is now advanced enough for *Ochnaceae* slides, and data capture is planned for the next year. Moreover, we shall gain the feasibility to provide sound illustrations, at any request for completing a specialized study, as well as for exhibitions and teaching purposes.

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### ОНОВЛЕННЯ БОТАНІЧНОЇ КОЛЕКЦІЇ МІКРОПРЕПАРАТІВ ФІЛІППА ВАН ТІЕМА У ГЕРБАРІЇ ПАРИЖА (P): ІСТОРИЧНЕ ЗНАЧЕННЯ, РЕСТАВРАЦІЯ ТА ПЕРСПЕКТИВИ

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Створені в основному на базі висушених гербарних зразків, колекції мікропрепаратів виступають незамінним джерелом анатомічних даних – особливо для судинних рослин – ботанічним надбанням, яке може бути плідно переопрацьоване в контексті сучасних досліджень.

Тут наведено приклад подібного застосування колекції Філіппа Ван Тіема (1839–1914), яка тісно пов'язана з гербарними зразками, а також первинними джерелами фітоморфологічних і монографічних опрацювань (особливо для родин *Loranthaceae* s.l. та *Ochnaceae*).

Після майже 70 років забуття було розпочато процес відновлення цієї колекції з метою забезпечити доступність цих гістологічних даних для ботанічної спільноти. У статті ми розкриваємо деякі технічні проблеми, пов'язані з її реставрацією, наводимо літературні та іконографічні джерела, а також обговорюємо перспективи наукового використання цієї колекції.

Все ще можна відновити детальний каталог зразків, який може бути корисним у друкованій формі, паралельно з перевіркою за літературними даними, з метою збору даних і зв'язування з начвними базами даних (наприклад, Sonnerat для гербарію P). Цей попередній етап зараз достатньо просунутий для мікропрепаратів *Ochnaceae*, і продовження збору даних планується на наступний рік. Крім того, ми отримуємо можливість надавати якісні ілюстрації на будь-яке прохання для закінчення спеціалізованих досліджень, а також для виставок і навчальних цілей.