

# INFOCOMP - the Compositae Types digital imaging project in Munich: *Hieracium*

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## INTRODUCTION

INFOCOMP is a project that uses modern archiving techniques for traditional botanical resources to make them globally available. It involves the digital imaging of Compositae nomenclatural types and their publication on the Internet. This Munich-based project is part of the BMBF-sponsored 'Biodiversity and Global Change' (BIOLOG) research program and represents the first specifically funded project of its kind in Germany.

## METHODOLOGY

The project is supported by three graduate scientists and a Database/Network administrator. There are two parallel areas of operation: the photographic and computer work, and the library based research. The imaging is carried out using a Nikon D1 digital camera and flash (+ diffuser) allowing a high degree of flexibility and mobility. Images are taken at a resolution of 2012 x 1324 pixels using JPEG file format.

The images are transferred to computers where they are standardised using Adobe Photoshop 5.5. For the internal organisation of the project the two database software programs "iView MediaPro" and "Filemaker Pro" are being used for data administration. The former is for the organisation of the image and text data, while retaining flexibility for other software options. The latter is used to capture the data and provides an integrated web interface allowing direct access to the database via the World Wide Web.



Fig. 1. *Hieracium laschii* Zahn ssp. *sacrimontis* Schack & Zahn. Images of label, whole sheet, habit, leaf, and capitulum detail (images are reduced to 25% original size).

On average five images per type are taken: the original label(s), the entire sheet, relevant habit detail, and macro images of taxonomically important features (figs 1 & 3). With the exception of label photos a 5 cm ruler is used. The images are linked with text information including basionym, author, protologue citation, type status, collector, collection number and year, continent, country, and region. Special emphasis is placed upon the correct and accurate citation of the protologue. The validity of the material and its status as a type is thoroughly checked in the literature.

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## RESULTS

Of the estimated 3,000 types held in the Munich Herbarium (M+MSB) 2,500 have been photographed (June 2002) resulting in approximately 10,500 high-resolution digital images. Selected material from the following tribes still has to be imaged: Anthemideae, Astereae, Eupatorieae, Senecioneae, Cardueae, Lactuceae, and Mutisieae.

*Hieracium* types form nearly a quarter of the Compositae types in the Munich herbarium. An estimated 720 type collections are recorded under *Hieracium* in the herbarium (*Stenotheca* 20; *Pilosella* c. 500; *Hieracium* c. 200). An additional c. 40 types from the Hans Schack herbarium are also held in Munich (Vogt & Schuhwerk 2000).

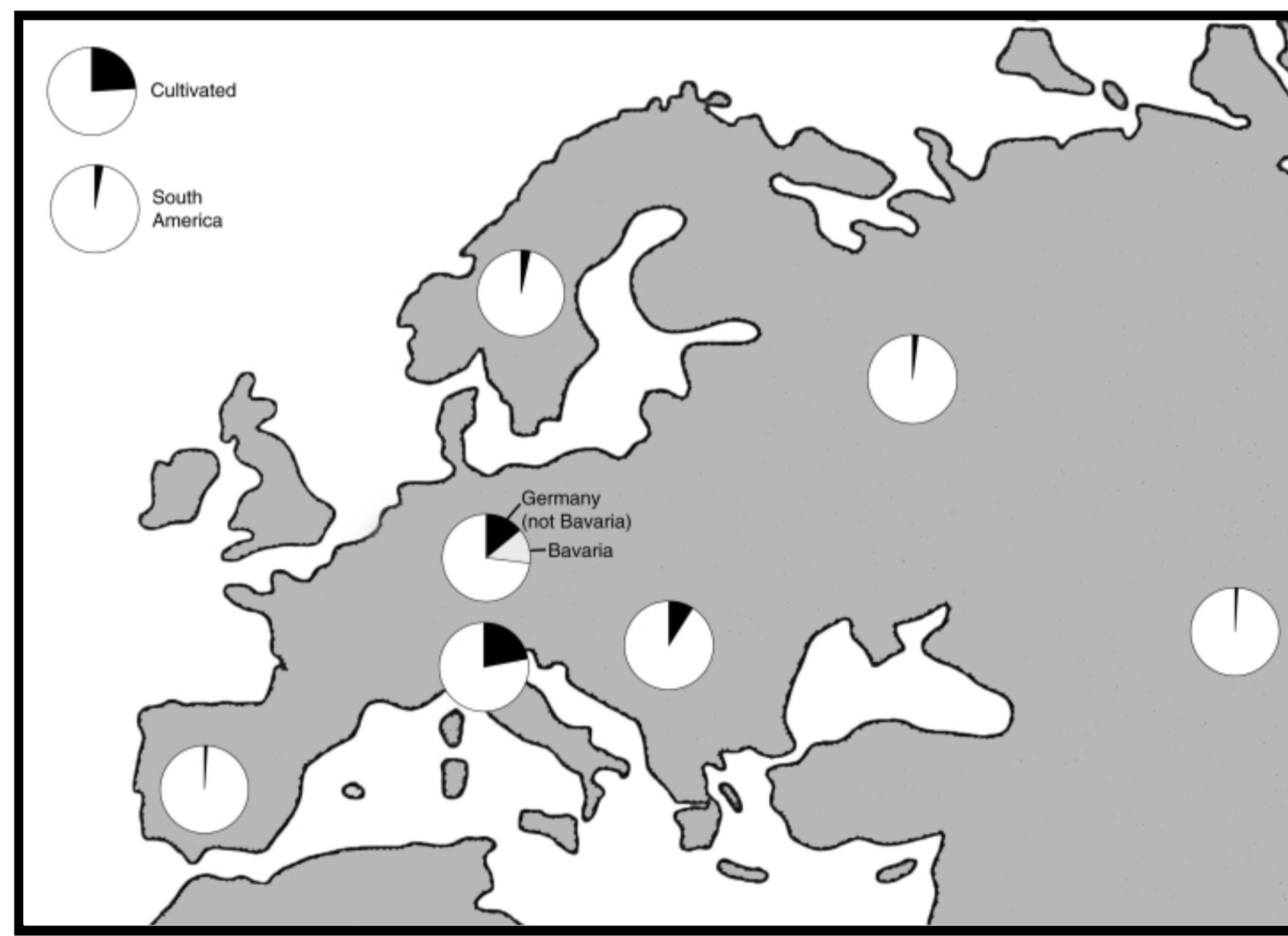


Fig. 2. Distribution of *Hieracium* type material as a percentage of *Hieracium* types held in Munich.

The geographical emphasis of the Compositae types overall lies in Africa, and North (Central) and South America. The *Hieracium* types, however, are almost exclusively from Europe (fig. 2). A number of these are from collections that have been cultivated, or arose, in the Munich Botanic Gardens. A further 50 % of the types come from Germany and Bavaria in particular, and from the Alps.

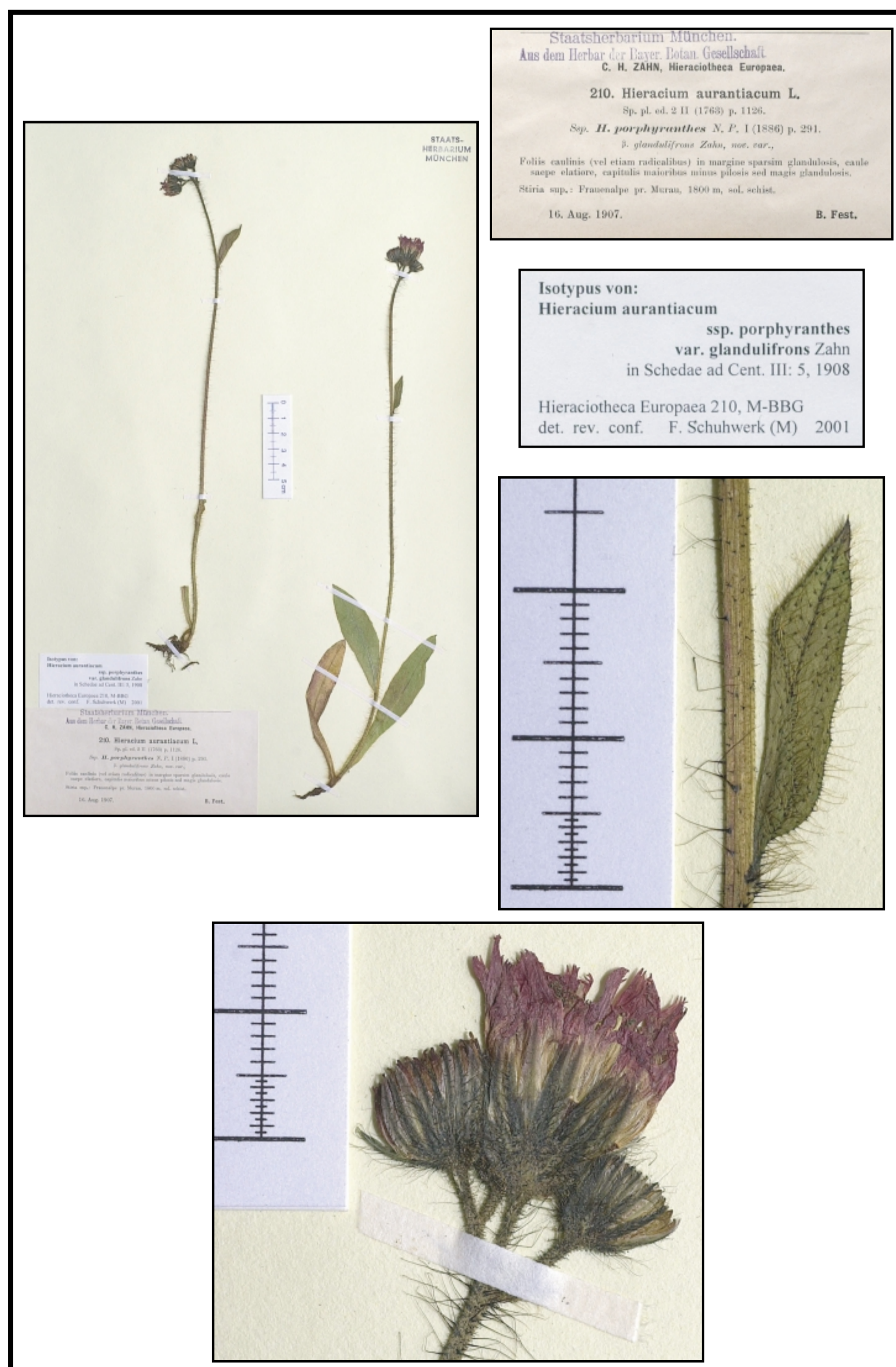


Fig. 3. *Hieracium aurantiacum* ssp. *porphyranthes* var. *glandulifrons* Zahn. Images of whole sheet, labels, leaf, and capitulum detail (images are reduced to 25% original size).

## SPECIAL CASE:

*Hieracium indumentum* images

*Hieracium* has presented a particular challenge for this project. The most significant taxonomic characters for this genus s.l. are the type, quantity, and distribution of indumentum on the leaves and involucre (see e.g., Schuhwerk & Lippert 1991). The general habit is easily portrayed by the digital imaging process already used, but the micrometre dimensions of the hairs are difficult to present accurately and consistently, even when using exceptionally high resolution (TIFF, no compression) with 60 mm (1:2.8 D) macro lens (fig. 4).



Fig. 4. *Hieracium laschii* Zahn ssp. *sacrimontis* Schack & Zahn. Capitulum detail with macro-lens.

As a result, several alternative techniques for higher magnification images have been tested with a view to archiving Munich's *Hieracium* types. Different digital cameras with varying pixel capacities and attachments to binocular optics were tried. An analogue medium, 100 ASA slide film, was also tested. The results from the digital cameras were very disappointing. The reasons for this are twofold:

1. the hair cells behave as airfilled chambers. Light refracts within the hairs creating a "shimmer" effect, distorting the edges. This is recorded as a fractured line, making the image appear blurred. The human eye is able to compensate constantly for this effect.

2. the pixel resolution severely limits the ability of the digital camera to record images of hairs. In fact the images are only significantly improved upon when slide film is used. This is the equivalent of approximately 12,000,000 "pixels" for 100 ASA film - this gives us four times better resolution than the CCD we currently use.

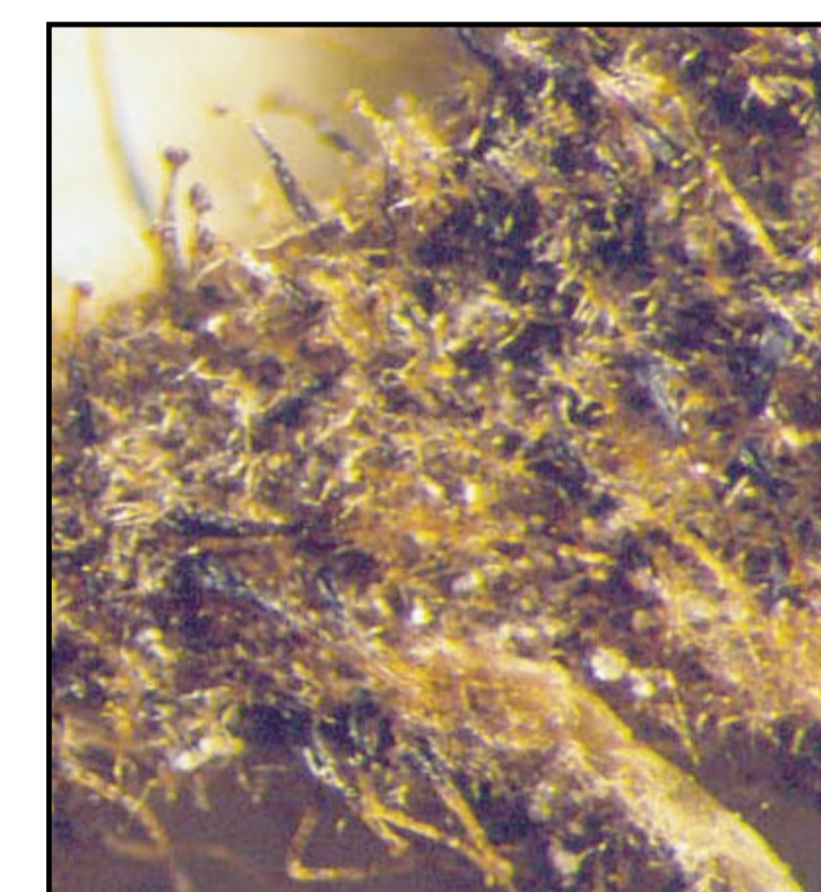


Fig. 5. *Hieracium xanthoporphyrum* Peter. Detail (x 50): below capitulum. 3 hair types: stellate, simple eglandular & glandular.

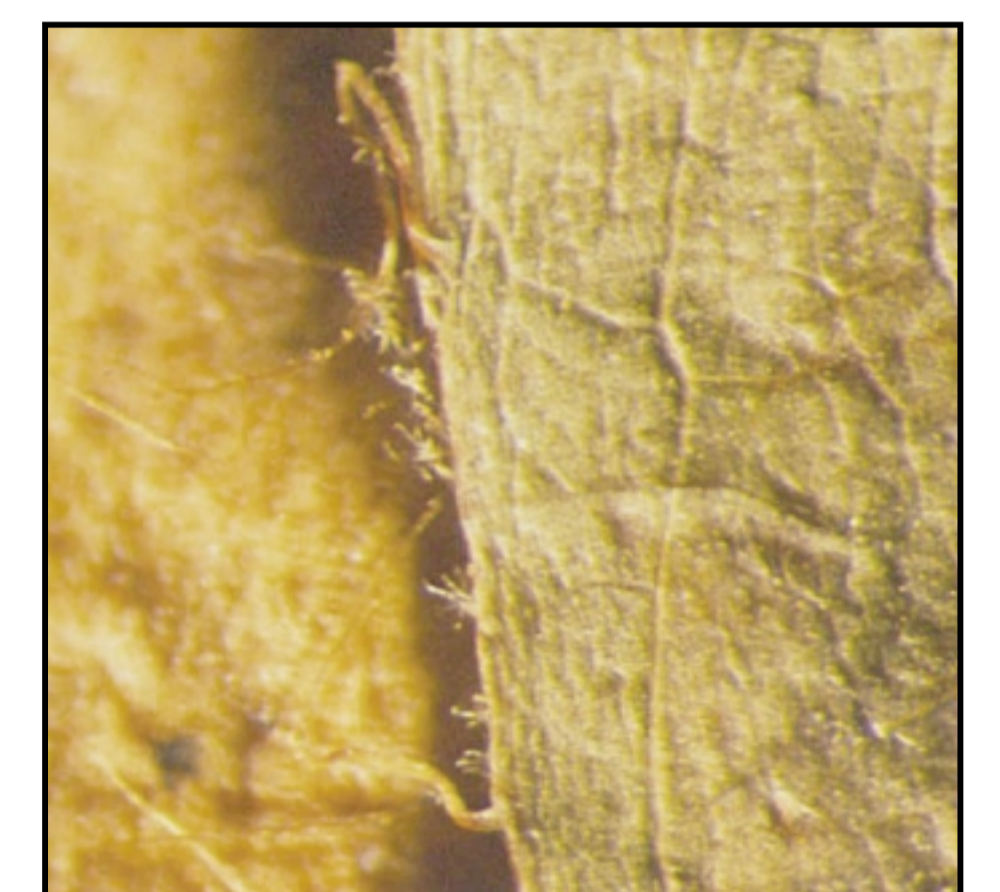


Fig. 6. *Hieracium stoloniflorum* ssp. *gremlichii* Nägeli & Peter. Detail (x 25): margin of basal leaf. 2 hair types: simple eglandular & stellate.

Figures 5 & 6 are examples of 100 ASA slide film pictures taken through a binocular microscope, demonstrating microfeatures of the indumentum.

The aim of the INFOCOMP project is to provide high quality, useful images for those scientists who need to work with Compositae nomenclatural types. As we have already made a great number of changes to our 'normal' imaging procedure in order to accommodate the vagaries of *Hieracium*, it would be very useful for us to know if these changes are good ones! Any comments or suggestions would be very welcome.

Any updates or changes to the database can be found via the web pages of the Botanische Staatssammlung München (<http://www.botanik.biologie.uni-muenchen/botsamml/home.html>).

## PUBLICATIONS & REFERENCES

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