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Applications of Medicinal Plants with Analysis

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ABOUT THE STUDY

Auto fluorescence of plant secretory cells has not yet been used as a parameter for pharmaceutical material characterization. It occurred, possibly as a result of a lack of attention paid to the emission of many natural individual compounds and components of medicinal herbs. Some of the earlier information was also found in thin-layer chromatography of extracts from pharmaceutically valuable plants on silica gel plates with separated compounds excited by ultraviolet light [1]. The study of the emission may be of interest to pharmacists, so much so that the new book of medicinal plants for pharmacologists does not include the information. The fluorescent method for analysis is still being developed and is based on the observation of microscopic images in transmitting light.

Previously, data on auto fluorescence of plant secretory cells and their emission spectra in the visible region were described and special monographs, but scientists' attention has not been focused solely on medicinal species. These studies have shown that the self-emission phenomenon can be used in the noninvasive analysis of plant secretory cells without the use of histochemical dyes. Fluorescent methods have revealed the presence and location of secondary metabolites within tissues and cells. The fluorescent technique has recently been applied to plant raw pharmaceutical material containing natural drugs in secretory structures [2].

Drugs such as alkaloids and anthraquinones were found in relatively high concentrations in the samples of *Chelidonium majus* and *Frangula alnus*. Secretory cells of laticifers containing the alkaloids chelerythrine and sanguinarine fluoresced in green-yellow, whereas second species enriched in anthraquinones fluoresced in orange-red. The spectral interference appears to occur in complex multicomponent samples, such as *Achillea millefolium, Artemisia absinthium,* and *Calendula officinalis,* because both terpenoids and phenols fluoresced brightly in glands and secretory hairs in blue or blue-green [3].

Fluorescence in various parts of medicinal plants using various techniques such as luminescence microscopy and its modifications such as microspectrofluorimetry and confocal microscopy. Pharmacologists will notice characteristic maxima in the fluorescence spectra of the objects, which they can use in their practice for preliminary drug identification. Fresh herbs of common sage *Salvia officinalis L., Lamiaceae,* European barberry *Berberis vulgaris L., Berberidaceae, hop Humulus lupulus L., Cannabaceae,* and *German chamomile (chamomile) Matricaria chamomile L., Asteraceae* were collected in summer in meadows and plantations near Oka River. The objects' details were observed using a Leica MZ 16 a stereomicroscope. As previously described, auto fluorescence of living cells was observed and photographed by the microscope on glass slides at room temperature 20-22 ℃ using Leica apparatuses (Germany) luminescence microscope Leica DM 6000 B (natural emission colors) and laser-scanning confocal microscope Leica TCS SP-5 (pictures were seen in pseudo colors). For visual observation, a mercury lamp was used, as was a laser Argon/2 (wavelengths 405, 458, 477, 488, and 514 nm) confocal microscopy registration was performed in three channels [4].

LSM 510 NLO chamomile pollen laser-scanning microscope Carl Zeiss was used in conjunction with the Argon 488 nm laser. Excitation with lasers at 458, 488, 543, and 633 nm produced emission fluorescence at 505-630 nm, 650-750 nm, and 650-750 nm, respectively. Using the pseudo color effects, three photomultipliers can capture fluorescence either separately or simultaneously. The image analysis was carried out using the software LSM 510 and Lucida Analyze 5. The excitation wavelength was used to select the pseudo colors blue for 488 nm, green for 543 nm, and red for 633 nm. The optical slices along the objects were layered images in their pseudo colors. The fluorescent dye Hoechst 33342 (Serva, USA) was used to detect the presence of nucleus in hop lupine.

Microspectrofluorimetry and confocal microscopy were used to record and analyses the emission spectra of intact cells. In the first case, the luminescence microscope was used in conjunction with the registration system in the microspectrofluorimeter MSF-1 manufactured by the Institute of Biological Techniques, Pushchino. Light at 360-380 nm was used to excite the emission. Cell fluorescence spectra were also recorded using the previously mentioned laser-scanning confocal microscope Leica TCS SP-5 (Germany) with laser excitation at 405 nm. Individual cells or parts of secretory structures were first identified as a region of interest (ROI) and denoted by rings or rectangles. The fluorescence intensity was determined by measuring the emission from the ROI [5].

CONCLUSION

Auto fluorescence has the potential to be one of the parameters of pharmaceutical material express-analysis. With luminescence microscopy and its recording modifications such as microspectrofluorimetry and confocal microscopy, the location of secretory cells containing natural drugs and the accumulation of secondary metabolites in the structures can be observed. Plant secretory cells contain a variety of fluorescing pharmaceuticals, including alkaloids, terpenes, phenols, flavones, and quinines, and their emission differs from that of chlorophyll. Scientists were able to distinguish secretory cells from non-secretory cells and identify the predominant component of secretions based on the emission characteristics (color images and fluorescence spectra). The luminescence in the express-analysis opens up possibilities for quickly determining whether the plant material is ready for pharmacy or not.

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