daß es sich hierbei um β-Hydroxyasparaginsäure handelte.

Die natürliche Aminosäure zeigte folgende optische Drehungswerte in verschiedenen pH-Lösungen (c=6.94): $[\alpha]_D^{23}$ +28.6 (in 3N HCl); +4.58 (in H_2O); −10.0° (in 1N NaOH); −0.7° (in 3N NaOH) und den kleinsten Wert in 1N NaOH–Lösung. Die Drehkurve nach Lutz[3] ist in ihrem Verlauf der Drehkurve der L-α-Aminosäure gleichwertig. Sie ist somit der Links–Reihe zuzuordnen.

Bei der Behandlung mit Salpetriger Säure[4] lieferte sie *meso*-Weinsäure vom Schmp. 151—153°, die sowohl chromatographisch (Phenol–Wasser/75:25, *Rf*: 0.19; *n*-Butanol–Essigsäure–Wasser/4:1:2, *Rf*: 0.22) als auch spektroskopisch identifiziert werden konnte. Nach obigen Ergebnissen wurde die Struktur dieser Aminosäure als *erythro*-β-Hydroxy-L-Asparaginsäure aufgeklärt.

β-Hydroxy-Asparaginsäure konnte bisher nur aus dem Hydrolysat von Casein isoliert werden.[5] Jetzt wurde es zum erstenmal in freier Form isoliert und charakterisiert.

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3) C. Djerassi, "Optical rotatory dispersion applications to organic chemistry," McGraw-Hill Book Co., New York, 1960.
4) H.J. Sallach, *J. Biol. Chem.*, **229**, 437 (1957).
5) H.J. Sallach und M.L. Karnguth, *Biochem. Biophys. Acta*, **34**, 582 (1959).

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A Pharmacognostical Application of Low–Temperature Ashing: Microscopic Observations on the Mineral Structure of "Dan-zhu-ye" and Its Related Species of *Graminae*

There has been an increasing interest, during the past few years, on the new technique of low–temperature ashing of organic material using a very reactive oxygen stream produced in a highfrequency electromagnetic field under a low pressure.[1] Oxygen discharged without electrodes, partly consisting of active species such as atomic and/or ionic oxygen (oxygen plasma), decomposes organic matrix by point bombardment, minimizing general heating of the material. Therefore, quantitative recovery of mineral constituents in organic specimens has become more feasible than with the conventional high–temperature ashing in a muffle furnace.

1) C.E. Gleit and W.D. Holland, *Anal. Chem.*, **34**, 1454 (1962); C.E. Gleit, *Am. J. Med. Electron.*, **2**, 112 (1963); C. Berkley, J. Churg, J. Selikoff, and W.E. Smith, *Ann. N.Y. Acad. Sci.*, **132**, 48 (1965); J. Hollahan, *J. Chem. Educ.*, **43**, A401 (1966); C.E. Mulford, *Atom. Absorp. Newsletter*, **5** (6), 135 (1966).

This new method was used for the microscopic examination of the mineral structure of some tissues (ashed tissue) of medicinal plants, crude drugs, and their sections by a low-temperature ashing of the specimens by the oxygen plasma. A Pyrex tubing (3.5×35 cm) was used as the ashing tube which was evacuated to a pressure of *ca.* 2 mmHg from one end while oxygen was introduced from the other end *via* a needle valve at the flow rate of 10 ml/min. A high-frequency output energy of about 70 W at 13.56 MHz was applied to a resonance coil tightly wound around the ashing tube, resulting in an approximate input power of 20 W into the oxygen stream. The specimen was placed 5—10 cm downstream from the end of the resonance coil under the above operating conditions, avoiding general heat decomposition of the specimen but with relatively fast cumbustion speed.

A comparison was made between this low-temperature ashing and the conventional Molisch method,[2] using the leaves of the crude drug, "Dan-zhu-ye," and its related species, and it was found by microscopic observation of the ashed tissues that this new method provided better preservation of the microstructure of mineral constituents in the organic material.

Four specimen of "Dan-zhu-ye" has been collected in Chinese markets (Manchuria and Lushan) and Korean markets (Seoul and Taegu). Other specimens of wild or cultivated *Lophatherum gracile* Brongn., *Phyllostachys bamboosoides* Sieb. et Zucc., *P. nigra* Munro var. *henonis* Stape, *P. heterocycla* Mitf. var. *pubescens* Ohwl., and *Leleba muleiplex* Nakai were collected in various parts of Japan. These specimens were ashed by this new method and the ashed tissues were examined under a microscope, especially the shape and arrangement of silicon bodies deposited in the epidermis of the leaves. Observations were made on both the surface and cross-sections, and the following facts were revealed.

1) The shape and arrangement of silicon bodies appear well in the specimens of *P. heterocycla* var. *pubescens* growing in various places.

2) The shape of silicon bodies in bamboo species is normally square or rectangle, though roundish or dumbbell shape is sometimes found. In *Lophatherum gracile*, two silicon bodies are coupled with a constricted center, forming a dumbbell shape.

3) Dark nuclear points were found in the transparent silicon bodies, mostly at the eccentric but occasionally at the central position. Bamboo species usually has one point in each silicon body but in rare cases two points are located symmetrically from the center. *Lophatherum gracile* has one or two nuclear points at either end of the dumbbell-shaped silicon body.

4) In most of the bamboo species, the silicon bodies are deposited exclusively along the vein with a regular arrangement but there are some with irregular arrangement of the silicon bodies which are distributed even in the mesophyll.

As a result of these examinations, it was concluded that the Chinese "Dan-zhu-ye" originates from *Lophatherum gracile* and the Korean one from *P. nigra* var. *henonis* or its related species.

Further studies are being made on the systematic characterization of the bamboo and its related species by this new method. This method is also considered to be useful for other plant tissues in stems, bark, and roots, and for some animal tissues. This low-temperature ashing is better than the conventional Molisch method, especially when using fresh tissues and section of plants, because of better preservation of the microstructure in the ashed tissues. Further, this new method will offer a new and useful technique for pharmacognostic and histological study of plants.

2) H. Molisch, "Aschenbild und Pflanzenverwandtschaft," Sitzungsber.Wien.Akad.Wiss.Math.nat.Kl.Abt. I. 1920, Nr. 129; *idem*, "Mikrochemie der Pflanze," Vol. III, Gustav Fischer, Jena, 1923, p. 9; K. Ohara and Y. Kondo, *Yakugaku Zasshi*, **49**, 1039 (1929); *idem*, *ibid.*, **51**, 738 (1931); K. Kimura and G. Nakagomi, *ibid.*, **51**, 40 (1931); Y. Kondo, *ibid.*, **53**, 505 (1933); *idem*, *ibid.*, **54**, 937, 1049 (1934).

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