

REFERENCES



- Aimi, N.; Yamanaka, E.; Endo, J.; Sakai, S., and Haginiwa, J.
"Conversion of Oxindole Alkaloids into Indole Alkaloids."
Tetrahedron Lett. 11 (March 1972) : 1081-1084.
- Aimi, N.; Yamanaka, E.; Shinma, N.; Fujiu, M.; Kurita, J.; Sakai, S.,
and Haginiwa, J. "Studies on Plants Containing Indole
Alkaloids. VI. Minor Bases of *Uncaria rhynchophylla* Miq."
Chem. Pharm. Bull. 25 (August 1977) : 2067-2071.
- Arens, H.; Stöckigt, J.; Weiler, E.W., and Zenk, M.H. "Radioimmunoassays
for the Determination of the Indole Alkaloids Ajmalicine and
Serpentine in Plants." Planta Med. 34 (August 1978) : 37-46.
- Au, T.Y.; Cheung, H.T., and Sternhell, S. "New *Corynanthe* Alkaloids
from *Strychnos angustiflora*." J. Chem. Soc. Perkin '
Transactions I (January 1973) : 13-16.
- Badger, G.M.; Cook, J.W., and Ongley, P.A. "The Chemistry of the
Mitragyna Genus. Part I." J. Chem. Soc. (March 1950) :
867-873.
- Barger, G.; Dyer, E., and Sargent, L.J. "The Alkaloids of *Mitragyna*
rotundifolia. I." J. Org. Chem. 4 (September 1939) : 418-427.
- Battersby, A.R. "Biosynthesis - II. Terpenoid Indole Alkaloids." In
The Alkaloids Vol. I. London : Burlington House, 1971.

- Battersby, A.R.; Brown, R.T.; Kapil, R.S.; Knight, J.A.; Martin, J.A., and Plunkett, A.O. "Further Evidence Concerning the Biosynthesis of Indole Alkaloids and Quinine." Chem. Comm. 23 (December 1966) : 888-890.
- Battersby, A.R.; Brown, R.T.; Kapil, R.S.; Martin, J.A., and Plunkett, A.O. "Role of Loganin in the Biosynthesis of Indole Alkaloids." Chem. Comm. 23 (December 1966) : 890-891.
- Battersby, A.R.; Brown, R.T.; Kapil, R.S.; Plunkett, A.O., and Taylor, J.B. "Biosynthesis of the Indole Alkaloids." Chem. Comm. 2 (January 1966) : 46-47.
- Battersby, A.R.; Brown, R.T.; Knight, J.A.; Martin, J.A., and Plunkett, A.O. "Biosynthesis of the Indole Alkaloids from a Monoterpene." Chem. Comm. 12 (June 1966) : 346-347.
- Battersby, A.R.; Burnett, A.R., and Parsons, P.G. "Partial Synthesis and Isolation of Vincoside and Isovincoside : Biosynthesis of the Three Major Classes of Indole Alkaloids from the β -Carboline System." Chem. Comm. (November 1968) : 1282-1284.
- Beckett, A.H.; Dwuma-Badu, D., and Haddock, R.E. "Some New *Mitragyna* - Type Indoles and Oxindoles; The Influence of Stereochemistry on Mass Spectra." Tetrahedron 25 (December 1969) : 5961-5969.
- Beckett, A.H.; Lee, C.M., and Tackie, A.N. "The Structure of Speciofoline and 'Stipulatine' (Rotundifoline)." Tetrahedron Lett. 25 (1963) : 1709-1714.

- Beckett, A.H.; Shellard, E.J.; Phillipson, J.D., and Lee, C.M.
"Alkaloids from *Mitragyna speciosa* Korth." J. Pharm. Pharmac.
17 (November 1965) : 753-755.
- Beckett, A.H.; Shellard, E.J.; Phillipson, J.D., and Lee, C.M.
"The *Mitragyna* species of Asia Part VI. Oxindole Alkaloids
from the Leaves of *Mitragyna speciosa* Korth." Planta Med. 14
(1966a) : 266-276.
- Beckett, A.H.; Shellard, E.J.; Phillipson, J.D., and Lee, C.M.
"The *Mitragyna* species of Asia Part VII. Indole Alkaloids
from the Leaves of *Mitragyna speciosa* Korth." Planta Med. 14
(1966b) : 277-288.
- Beckett, A.H.; Shellard, E.J.; Phillipson, J.D., and Lee, C.M.
"The Isolation and Characterisation of Some Alkaloids from
the Leaves of *Mitragyna speciosa* Korth." In Scientiae
Pharmaceuticae - I, pp. 303-304. Edited by Hanč, O. and
Hubík, J. Prague : Czechoslovak Medical Press, 1966c.
- Beckett, A.H.; Shellard, E.J.; Phillipson, J.D., and Lee, C.M.
"The Structure and Stereochemistry of Some Alkaloids from the
Leaves of *Mitragyna speciosa* Korth." In Scientiae
Pharmaceuticae - I, pp. 321-324. Edited by Hanč, O. and
Hubík, J. Prague : Czechoslovak Medical Press, 1966d.
- Beckett, A.H.; Shellard, E.J., and Tackie, A.N. "The *Mitragyna* Species
of Ghana. The Alkaloids of the Leaves of *Mitragyna stipulosa*
(DC.) O. Kuntze." J. Pharm. Pharmac. 15 (December 1963a),
suppl. : 158T-165T.

- Beckett, A.H.; Shellard, E.J., and Tackie, A.N. "The *Mitragyna* Species of Ghana. The Alkaloids of the Leaves of *Mitragyna ciliata* Aubr. et Pellegr." J. Pharm. Pharmac. 15 (December 1963b), suppl. : 166T-169T.
- Beckett, A.H.; Shellard, E.J., and Tackie, A.N. "The *Mitragyna* Species of Asia Part IV. The Alkaloids of the Leaves of *Mitragyna speciosa* Korth. Isolation of Mitragynine and Speciofoline." Planta Med. 13 (May 1965) : 241-246.
- Beckett, A.H., and Tackie, A.N. "Structure of Rotundifoline and 'Mitragynol' (Isorotundifoline)." Chem. and Ind. 27 (1963a) : 1122-1123.
- Beckett, A.H., and Tackie, A.N. "The Structures of the Alkaloids from *Mitragyna* Species of Ghana." J. Pharm. Pharmac. 15 (December 1963b), suppl. : 267T-269T.
- Beecham, A.F.; Hart, N.K.; Johns, S.R., and Lamberton, J.A. "The Stereochemistry of Oxindole Alkaloids : Uncarine A, B (Formosanine), C (Pteropodine), D (Speciophylline), E (Isopteropodine) and F." Aust. J. Chem. 21 (February 1968) : 491-504.
- Blackstock, W.P.; Brown, R.T., and Lee, G.K. "Configuration at C₃ in Vincoside." Chem. Comm. 16 (August 1971) : 910-911.
- Blumenthal, A.; Eugster, C.H., and Karrer, P. "Trennung von Corynanthein und Dihydrocorynanthein." Helv. Chim. Acta. 37 (1954) : 787-790.

- Burkill, I.H. A Dictionary of the Economic Products of the Malay Peninsula. Vol II. Oxford : University Press, 1935.
- Chan, K.C. "Gambirdine and Isogambirdine, the Alkaloids from *Uncaria gambir* (Hunt.) Roxb." Tetrahedron Lett. 30 (June 1968) : 3403-3406.
- Chan, K.C.; Morsingh, F., and Yeoh, G.B. "Alkaloids of *Uncaria pteropoda*. Isolation and Structures of Pteropodine and Isopteropodine." J. Chem. Soc. Section C (December 1966) : 2245-2249.
- Cu, N.A.; Goutarel, R., and Janot, M.M. "Alcaloides der *Pseudocinchona africana* Aug, Chev. : La Corynoxine et la Corynoxine, deux Nouveaux Alcaloides Oxindoleiques. Identite de la Rhynchophylline et de la Dihydrocorynoxine." Bull. Soc. Chim. France. 108 (April-June 1957) : 1292-1294.
- Dutta, S.C.; Bhattacharya, S.K., and Ray, A.B. "Flower Alkaloids of *Alstonia scholaris*." Planta Med. 30 (August 1976) : 86-89.
- Farnsworth, N.R. "The Phytochemistry and Biological Activity of *Catharanthus lanceus* (Apocynaceae)." In Plant in the Development of Modern Medicine, pp. 279-302. Edited by Swain, T. Massachusetts : Harvard University Press, 1972.
- Field, E. "Mitragynine and Mitraversine, Two New Alkaloids from Species of *Mitragyna*." J. Chem. Soc. 119 (1921) : 887-891.

- Finch, N., and Taylor, W.I. "The Conversion of Tetrahydro- β -carboline Alkaloids into Oxindoles. The Structures and Partial Synthesis of Mitraphylline and Rhynchophylline." J. Am. Chem. Soc. 84 (April 1962a) : 1318-1320.
- Finch, N., and Taylor, W.I. "Oxidative Transformations of Indole Alkaloids. I. The Preparation of Oxindoles from Yohimbine; the Structures and Partial Syntheses of Mitraphylline, Rhynchophylline and Corynoxetine." J. Am. Chem. Soc. 84 (1962b) : 3871-3877.
- Gilbert, B.; Antonaccio, L.D., and Djerassi, C. "Alkaloid Studies. XXXIX. The Occurrence of Dihydrocorynantheol and Aricine in *Aspidosperma marcgravianum* Woodson." J. Org. Chem. (December 1962) : 4702-4704.
- Habib, M.S., and Court, W.E. "Leaf Alkaloids of *Rauwolfia caffra*." Phytochem. 13 (1974a) : 661-662.
- Habib, M.S., and Court, W.E. "The Separation and Identification of Microquantities of *Rauwolfia* Alkaloids." Planta Med. 25 (1974b) : 331-341.
- Hart, N.K.; Johns, S.R., and Lamberton, J.A. "Uncarine C, D (Speciophylline), E and F : C-3 and C-7 Epimeric Oxindoles Related to Tetrahydroalstonine." Chem. Comm. 2 (January 1967) : 87-88.
- Hemingway, S.R.; Houghton, P.J.; Phillipson, J.D., and Shellard, E.J. "9-Hydroxyrhynchophylline - Type Oxindole Alkaloids." Phytochem. 14 (February 1975) : 557-563.

- Hemingway, S.R., and Phillipson, J.D. "Alkaloids from S. American Species of *Uncaria* (Rubiaceae)." J. Pharm. Pharmac. 26 (December 1974), suppl. : 113P.
- Hendrickson, J.B. "Structures of Mitragynine and the Minor *Mitragyna* Alkaloids." Chem. and Ind. 21 (1961) : 713-714.
- Hendrickson, J.B. "Stereochemistry of the *Mitragyna* Alkaloids." J. Am. Chem. Soc. 84 (February 1962) : 650-653.
- Hendrickson, J.B., and Sims, J.J. "*Mitragyna* Alkaloids : The Structure of Stipulatine." Tetrahedron Lett. 14 (July 1963) : 929-935.
- Henry, T.A. "The Alkaloids of *Picralima klaineana* Pierre. Part II." J. Chem. Soc. (1932) : 2759-2768.
- Hesse, M. Indolalkaloide in Tabellen. Berlin : Springer-Verlag, 1964.
- Hochstein, F.A. "Alkaloids of *Rauwolfia sellowii*." J. Am. Chem. Soc. 77 (October 1955) : 5744-5745.
- Hochstein, F.A.; Murai, K., and Boegemann, W.H. "Alkaloids of *Rauwolfia heterophylla*." J. Am. Chem. Soc. 77 (July 1955) : 3551-3554.
- Houghton, P.J.; Lala, P.K.; Shellard, E.J., and Sarpong, K. "The Alkaloids of *Mitragyna stipulosa* (DC.) O. Kuntze." J. Pharm. Pharmac. 28 (August 1976) : 664.
- Houghton, P.J., and Shellard, E.J. "The Interconversion of Open and Closed E ring Oxindole Alkaloids in *Mitragyna* species." J. Pharm. Pharmac. 25 (1973), suppl. : 143P-144P.

- Houghton, P.J., and Shellard, E.J. "The *Mitragyna* Species of Asia Part XXVIII. The Alkaloidal Pattern in *Mitragyna rotundifolia* from Burma." Planta Med. 26 (August 1974) : 104-112.
- Ing, H.R., and Raison, C.G. "The Alkaloids of *Mitragyna speciosa*. Part I. Mitragynine." J. Chem. Soc. (1939) : 986-990.
- Iwu, M.M., and Court, W.E. "Root Alkaloids of *Rauwolfia cumminsi* Stapf." Planta Med. 32 (August 1977) : 158-161.
- Iwu, M.M., and Court, W.E. "The Alkaloids of *Rauwolfia mombasiana* Leaves." Planta Med. 33 (May 1978) : 232-236.
- Jackson, A.H., and Smith, A.E. "Electrophilic Substitution in Indoles - II. The Formation of 3,3-Spirocyclic Indole Derivatives from Tryptamines and Their Rearrangement to β -Carbolines." Tetrahedron 24 (January 1968a) : 403-413.
- Jackson, A.H., and Smith, P. "Electrophilic Substitution in Indoles- III. Rearrangement of 3,3-Dialkyl Indolenines." Tetrahedron 24 (March 1968b) : 2227-2239.
- Johns, S.R., and Lambertson, J.A. "Uncaria Alkaloids : Two Stereoisomers of Mitraphylline from *Uncaria bemsaysii* F. v. Muell. and *U. ferrea* DC." Tetrahedron Lett. 40 (October 1966) : 4883-4888.
- Klohs, M.W.; Draper, M.D.; Keller, F.; Malesh, W., and Petracek, F.J. "Alkaloids of *Rauwolfia serpentina* Benth. II. The Isolation of Naturally Occurring Py-tetrahydroserpentine (Ajmalicine) and Contribution Toward Its Structure." J. Am. Chem. Soc. 76 (March 1954) : 1332-1334.

- Leow, P.; Goeggel, H., and Arigoni, D. "A Monoterpene Precursor in the Biosynthesis of Indole Alkaloids." Chem. Comm. 12 (June 1966) : 347-348.
- Madati, P.J.; Kayani, M.J.; Pazi, H.A.M., and Nyamgenda, A.F.D. "Alkaloids of *Rauwolfia caffra* Sond. I. Phytochemical and Toxicological Studies." Planta Med. 32 (1977) : 258-267.
- Mahler, H.R., and Cordes, E.H. Biological Chemistry. New York : Harper and Row, 1966.
- Mattoon, J.R. "The Biosynthesis of Amino Acids." In Biochemistry of Natural Compounds, pp. 1-17. Edited by Bernfeld, P. London : Pergamon Press, 1963.
- Merlini, L.; Mondell, R.; Nasini, G., and Hesse, M. "The Structure of Roxburghines A - E, New Alkaloids from an *Uncaria* sp." Tetrahedron 26 (May 1970) : 2259-2279.
- Merlini, L.; Nasini, G., and Haddock, R.E. "Indole Alkaloids from *Uncaria gambir*." Phytochem. 11 (March 1972) : 1525-1526.
- Merlini, L.; Nasini, G., and Phillipson, J.D. "Structure and Synthesis of New Natural Heteroyohimbine N-oxides." Tetrahedron 28 (December 1972) : 5971-5975.
- Moza, B.K., and Trojáněk, J. "New Alkaloids from *Catharanthus roseus* G. Don." Chem. and Ind. (August 1962) : 1425-1426.
- Müller, J.M. "Über die Alkaloide von *Rauwolfia ligustrina* R. & S. Raugustin, ein neues Reserpinähnliches Alkaloids." Experientia 13 (December 1957) : 479-481.

- Neuss, N.; Boaz, H.E., and Forbes, J.W. "*Rawolfia* Alkaloids. II. Isolation and Characterisation of Two New Alkaloids from *Rawolfia serpentina* Benth." J. Am. Chem. Soc. 76 (June 1954) : 3234-3236.
- Nozoye, T. "Studies on *Uncaria* Alkaloid. XVIII. Structure of Uncarine Structure of Uncarine-A and Uncarine-B." Chem. Pharm. Bull. 6 (June 1958a) : 300-306.
- Nozoye, T. "Studies on *Uncaria* Alkaloid. XIX. On Mitraphylline." Chem. Pharm. Bull. 6 (June 1958b) : 306-308.
- Nozoye, T. "Studies on *Uncaria* Alkaloid. XX. Structure of Rhynchophylline and Isorhynchophylline." Chem. Pharm. Bull. 6 (June 1958c) : 309-312.
- Pakrasshi, S.C.; Djerassi, C.; Wasicky, R., and Neuss, N. "Alkaloid Studies. IX. *Rawolfia* Alkaloids. IV. Isolation of Reserpine and Other Alkaloids from *Rawolfia sellowii* Muell. Argov." J. Am. Chem. Soc. 77 (December 1955) : 6687-6689.
- Patel, M.B.; Poisson, J.; Pousset, J.L., and Rowson, J.M. "Alkaloids of the Leaves of *Rawolfia vomitoria* Afz." J. Pharm. Pharmac. 16 (December 1964), suppl. : 163T-165T.
- Phillipson, J.D. "The Alkaloidal Content of Some Asian Species of *Mitragyna*." Ph.D. dissertation, Department of Pharmacognosy, Chelsea College, University of London, 1965.
- Phillipson, J.D., and Hemingway, S.R. "Indole and Oxindole Alkaloids from *Uncaria bernaysi*." Phytochem. 12 (June 1973a) : 1481-1487.

- Phillipson, J.D., and Hemingway, S.R. "Alkaloids of *Uncaria longiflora*." Phytochem. 12 (September-December 1973b) : 2791-2794.
- Phillipson, J.D., and Hemingway, S.R. "Oxindole Alkaloids from *Uncaria macrophylla*." Phytochem. 12 (September-December 1973c) : 2795-2798.
- Phillipson, J.D., and Hemingway, S.R. "Chromatographic and Spectroscopic Methods for the Identification of Alkaloids from Herbarium Samples of the Genus *Uncaria*." J. Chromatog. 105 (February 1975a) : 163-178.
- Phillipson, J.D., and Hemingway, S.R. "Alkaloids of *Uncaria attenuata*, *U. orientalis* and *U. canescens*." Phytochem. 14 (August 1975b) : 1855-1863.
- Phillipson, J.D.; Hemingway, S.R.; Bisset, N.G.; Houghton, P., and Shellard, E.J. "Angustine and Related Alkaloids from Species of *Mitragyna*, *Nauclea*, *Uncaria* and *Strychnos*." Phytochem. 13 (June 1974) : 973-978.
- Phillipson, J. D.; Hemingway, S.R., and Ridsdale, C.E. "Alkaloids of *Uncaria*. Part V. Their Occurrence and Chemotaxonomy." Lloydia 41 (November-December 1978) : 503-570.
- Phillipson, J.D.; Rungsiyakul, D., and Shellard, E.J. "N-oxides of the Oxindole Alkaloids, Isorhynchophylline, Rhynchophylline, Rhynchociline and Ciliaphylline." Phytochem. 12 (July 1973) : 2043-2048.

- Phillipson, J.D., and Shellard, E.J. "The Effect of Methoxy Substitution and Configuration on the Thin-layer Chromatographic Behaviour of Some Heteroyohimbine Alkaloids." J. Chromatog. 31 (October 1967) : 427-438.
- Phillipson, J.D.; Tantivatana, P.; Tarpo, E., and Shellard, E.J. "Hirsuteine and Mitrajavine from *Mitragyna hirsuta*." Phytochem. 12 (July 1973) : 1507.
- Ponglux, D.; Tantivatana, P., and Pummangura, S. "Alkaloids from the Leaves of *Uncaria homomalla*." Planta Med. 31 (February 1977) : 26-30.
- Ridsdale, C.E. "A Revision of *Mitragyna* and *Uncaria* (Rubiaceae)." Blumea 24 (1978) : 43-100.
- Robinson, R., and Thomas, A.F. "The Alkaloids of *Picralima nitida* Stapf., Th. and H. Durand. Part I. The Structure of Akuammigine." J. Chem. Soc. (October-December 1954) : 3479-3482.
- Rueffer, M.; Nagakura, N., and Zenk, M.H. "Strictosidine, the Common Precursor for Monoterpenoid Indole Alkaloids with 3 α and 3 β Configuration." Tetrahedron Lett. 18 (April 1978) : 1593-1596.
- Rungsiyakul, D. "The Alkaloids of *Mitragyna tubulosa* Havil." Ph.D. dissertation, Department of Pharmacognosy, Chelsea College, University of London, 1973.

- Sabri, N.N., and Court, W.E. "Stem Alkaloids of *Rauwolfia vomitoria*." Phytochem. 17 (1978) : 2023-2027.
- Sarin, J.P.S.; Nandi, R.C.; Kapil, R.S., and Khanna, N.M. "Estimation of Ajmalicine in *Catharanthus roseus* Linn." Indian J. Pharm. 39 (May-June 1977) : 62-64.
- Sastri, N.B. The Wealth of India Vol. VI. New Delhi : Sree Sarasawaty Press, 1962.
- Saxton, J.E. "The Indole Alkaloids." In The Alkaloids Chemistry and Physiology, pp. 4-199. Edited by Manske, R.H.F. New York : Academic Press, 1960.
- Saxton, J.E. "Alkaloids of *Mitragyna* and *Ourouparia* Species." In The Alkaloids Chemistry and Physiology, pp. 59-91. Edited by Manske, R.H.F. New York : Academic Press, 1965a.
- Saxton, J.E. "Alkaloids of *Alstonia* Species." In The Alkaloids Chemistry and Physiology, pp. 159-202. Edited by Manske, R.H.F. New York : Academic Press, 1965b.
- Saxton, J.E. "Alkaloids of *Mitragyna* and *Ourouparia* Species." In The Alkaloids Chemistry and Physiology, pp. 521-543. Edited by Manske, R.H.F. New York : Academic Press, 1968.
- Saxton, J.E. "Alkaloids of *Mitragyna* and Related Genera." In The Alkaloids Chemistry and Physiology, pp. 123-156. Edited by Manske, R.H.F. New York : Academic Press, 1973.

- Schlittler, E. "*Rauwolfia* Alkaloids with Special Reference to the Chemistry of Reserpine." In The Alkaloids Chemistry and Physiology, pp. 287-292. Edited by Manske, R.H.F. New York : Academic Press, 1965.
- Seaton, J.C.; Nair, M.D.; Edwards, O.E., and Marion, L. "The Structure of Stereoisomerism of Three *Mitragyna* Alkaloids." Can. J. Chem. 38 (July 1960) : 1035-1042.
- Seaton, J.C.; Tondeur, R., and Marion, L. "The Structure of Mitraphylline." Can. J. Chem. 36 (July 1958) : 1031-1038.
- Shamma, M; Shine, R.J.; Kompis, I.; Sticzay, T.; Morsingh, F.; Poisson, J., and Pousset, J.L. "The Stereochemistry of the Pentacyclic Oxindole Alkaloids." J. Am. Chem. Soc. 89 (March 1967) : 1739-1740.
- Shavel Jr., J., and Zinnes, H. "Oxindole Alkaloids I. Oxidative - Rearrangement of Indole Alkaloids to Their Oxindole Analogs." J. Am. Chem. Soc. 84 (April 1962) : 1320-1321.
- Shellard, E.J.; Beckett, A.H.; Tantivatana, P.; Phillipson, J.D., and Lee, C.M. "Alkaloids from *Mitragyna javanica* Koord and Valetton and *Mitragyna hirsuta* Havil." J. Pharm. Pharmac. 18 (August 1966) : 553-555.
- Shellard, E.J.; Beckett, A.H.; Tantivatana, P.; Phillipson, J.D., and Lee, C.M. "The *Mitragyna* Species of Asia Part VIII. The Alkaloids of the Leaves of *Mitragyna javanica* var. *microphylla* Koord and Valetton." Planta Med. 15 (1967) : 245-253.

- Shellard, E.J., and Houghton, P.J. "The *Mitragyna* Species of Asia Part XIX. The Alkaloidal Pattern in *Mitragyna parvifolia* (Roxb.) Korth." Planta Med. 20 (1971) : 82-89.
- Shellard, E.J., and Houghton, P.J. "The Conversion of *Pseudo* Heteroyohimbine Alkaloids to Oxindoles Part II. 'In vivo' Studies in *Mitragyna parvifolia* (Roxb.) Korth." Planta Med. 21 (1972a) : 16-21.
- Shellard, E.J., and Houghton, P.J. "The *Mitragyna* Species of Asia Part XX. The Alkaloidal Pattern in *Mitragyna parvifolia* (Roxb.) Korth. from Burma." Planta Med. 21 (1972b) : 263-266.
- Shellard, E.J., and Houghton, P.J. "The *Mitragyna* Species of Asia Part XXI. The Distribution of Alkaloids in Young Plants of *Mitragyna parvifolia* Grown from Seed Obtained from Ceylon." Planta Med. 21 (1972c) : 382-392.
- Shellard, E.J., and Houghton, P.J. "The *Mitragyna* Species of Asia Part XXII. The Distribution of Alkaloids in Young Plants of *Mitragyna parvifolia* Grown from Seeds Obtained from Uttar Pradesh State of India." Planta Med. 22 (1972d) : 97-102.
- Shellard, E.J., and Houghton, P.J. "The *Mitragyna* Species of Asia Part XXIV. The Isolation of Dihydrocorynantheol and Corynantheidol from the Leaves of *Mitragyna parvifolia* (Roxb.) Korth. from Sri Lanka (Ceylon)." Planta Med. 24 (August 1973a) : 13-17.

- Shellard, E.J., and Houghton, P.J. "The *Mitragyna* Species of Asia Part XXV. 'In vivo' Studies, Using ^{14}C -Alkaloids, in the Alkaloidal Pattern in Young Plants of *Mitragyna parvifolia* Grown from Seed Obtained from Ceylon." Planta Med. 24 (August 1973b) : 341-352.
- Shellard, E.J., and Houghton, P.J. "The *Mitragyna* Species of Asia Part XXVI. Further 'In vivo' Studies Using ^{14}C -Alkaloids, in the Alkaloidal Pattern in Young Plants of *Mitragyna parvifolia* (Roxb.) Korth. Grown from Seed Obtained from Sri Lanka (Ceylon)." Planta Med. 25 (February 1974a) : 80-87.
- Shellard, E.J., and Houghton, P.J. "The *Mitragyna* Species of Asia Part XXVII. The Alkaloidal N-oxides in the Leaves of *Mitragyna parvifolia* (Roxb.) Korth. from Sri Lanka." Planta Med. 25 (April 1974b) : 172-174.
- Shellard, E.J.; Houghton, P.J., and Lala, P.K. "Rotundifoline N-oxides." Phytochem. 16 (July 1977) : 1427-1429.
- Shellard, E.J.; Houghton, P.J., and Resha, M. "The *Mitragyna* Species of Asia Part XXX. Oxidation Products of Mitragynine and Speciociliatine." Planta Med. 33 (May 1978a) : 223-227.
- Shellard, E.J.; Houghton, P.J., and Resha, M. "The *Mitragyna* Species of Asia Part XXXI. The Alkaloids of *Mitragyna speciosa* Korth. from Thailand." Planta Med. 34 (August 1978b) : 26-36.
- Shellard, E.J.; Houghton, P.J., and Resha, M. "The *Mitragyna* Species of Asia Part XXXII. The Distribution of Alkaloids in Young

- Plants of *Mitragyna speciosa* Korth. Grown from Seed Obtained from Thailand." Planta Med. 34 (November 1978c) : 253-263.
- Shellard, E.J., and Lala, P.K. "The *Mitragyna* Species of Asia Part XXIX. The Alkaloidal Pattern in the Leaves, Stem Bark and Root Bark of *Mitragyna parvifolia* from the Kerala State, India." Planta Med. 31 (1977) : 395-399.
- Shellard, E.J., and Lala, P.K. "The Alkaloids of *Mitragyna rubrostipulata* (Schum.) Havil." Planta Med. 33 (February 1978) : 63-69.
- Shellard, E.J., and Phillipson, J.D. "The *Mitragyna* Species of Asia Part I. The Alkaloids of the Leaves of *Mitragyna rotundifolia* (Roxb.) O. Kuntze." Planta Med. 12 (March 1964a) : 27-32.
- Shellard, E.J., and Phillipson, J.D. "The *Mitragyna* Species of Asia Part II. The Alkaloids of the Leaves of *Mitragyna parvifolia* (Roxb.) Korth." Planta Med. 12 (June 1964b) : 160-165.
- Shellard, E.J.; Phillipson, J.D., and Gupta, D. "The Effect of Methoxy Substitution and Configuration on the Thin-layer Chromatographic Behaviour of Some Closed E Ring Oxindole Alkaloids." J. Chromatog. 32 (1968a) : 704-714.
- Shellard, E.J.; Phillipson, J.D., and Gupta, D. "The *Mitragyna* Species of Asia Part XI. The Alkaloids of the Leaves of *Mitragyna parvifolia* (Roxb.) Korth. Obtained from the Maharashtra State of India." Planta Med. 16 (February 1968b) : 20-28.

- Shellard, E.J.; Phillipson, J.D., and Gupta, D. "The *Mitragyna* Species of Asia Part XIII. The Alkaloids of the Leaves of *Mitragyna parvifolia* (Roxb.) Korth. Obtained from India." Planta Med. 16 (1968c) : 436-445.
- Shellard, E.J.; Phillipson, J.D., and Gupta, D. "The *Mitragyna* Species of Asia Part XIV. The Alkaloids of the Leaves of *Mitragyna parvifolia* Obtained from Burma, Cambodia and Ceylon." Planta Med. 17 (1969a) : 51-58.
- Shellard, E.J.; Phillipson, J.D., and Gupta, D. "The *Mitragyna* Species of Asia Part XV. The Alkaloids from the Bark of *Mitragyna parvifolia* (Roxb.) Korth. and a Possible Biogenetic Route for the Oxindole Alkaloids." Planta Med. 17 (1969b) : 146-163.
- Shellard, E.J.; Phillipson, J.D., and Sarpong, K. "Rhynchophylline and Isorhynchophylline N-oxides from *Mitragyna*." Phytochem. 10 (October 1971) : 2505-2511.
- Shellard, E.J., and Rungsiyakul, D. "The *Mitragyna* Species of Asia Part XXIII. The Alkaloids of the Leaves of *Mitragyna tubulosa* Havil." Planta Med. 23 (February 1973) : 221-225.
- Shellard, E.J., and Sarpong, K. "The Alkaloids of the Leaves of *Mitragyna inermis* (Willd.) O. Kuntze." J. Pharm. Pharmac. 21 (December 1969), suppl. : 113S-117S.
- Shellard, E.J., and Sarpong, K. "The Alkaloidal Pattern in the Leaves, Stem-Bark and Root-Bark of *Mitragyna* Species from Ghana." J. Pharm. Pharmac. 22 (December 1970), suppl. : 34S-39S.

- Shellard, E.J., and Sarpong, K. "Isolation of Speciogynine from the Leaves of *Mitragyna inermis* (Willd.) O. Kuntze." J. Pharm. Pharmac. 23 (July 1971a) : 559.
- Shellard, E.J., and Sarpong, K. "The Conversion of *Pseudo* Heteroyohimbine Alkaloids to Oxindoles Part I. 'In vitro' Studies." Planta Med. 20 (1971b) : 167-171.
- Shellard, E.J., and Sarpong, K. "The Structure of Isomitrajavine." Tetrahedron 27 (May-June 1971c) : 1725-1729.
- Shellard, E.J.; Tantivatana, P., and Beckett, A.H. "The *Mitragyna* Species of Asia Part X. The Alkaloids of the Leaves of *Mitragyna hirsuta* Havil." Planta Med. 15 (1967) : 366-370.
- Siddiqui, S., and Siddiqui, R.H. "Chemical Examination of the Roots of *Rauwolfia serpentina* Benth." J. Indian Chem. Soc. 8 (1931) : 667-680.
- Silpavisavanont, Y. "Alkaloids from *Uncaria quadrangularis* Geddes." Master's thesis, Department of Pharmacognosy, Graduate School, Chulalongkorn University, 1976.
- Stöckigt, J.; Rueffer, M.; Zenk, M.H., and Hoyer, G.A. "Indirect Identification of 4,21-Dehydrocorynantheine Aldehyde as an Intermediate in the Biosynthesis of Ajmalicine and Related Alkaloids." Planta Med. 33 (March 1978) : 188-192.
- Stöckigt, J., and Zenk, M.H. "Strictosidine (Isovincoside) : The Key Intermediate in the Biosynthesis of Monoterpenoid Indole Alkaloids." Chem. Comm. 14 (July 1977) : 646-648.

- Supavita, T. "Alkaloids of *Uncaria attenuata* Korth." Master's thesis, Department of Pharmaceutical Botany, Graduate School, Chulalongkorn University, 1979.
- Tantivatana, P.; Ponglux, D.; Jirawongse, V., and Silpavisavanont, Y. "Alkaloids from *Uncaria quadrangularis* ." Planta Med. 35 (January 1979) : 92-96.
- Taylor, W.I., and Farnsworth, N.R. The Catharanthus Alkaloids. New York : Marcel Dekker, 1975.
- Timmins, P., and Court, W.E. "Alkaloids of *Rauvolfia macrophylla*." Phytochem. 13 (1974a) : 281-282.
- Timmins, P., and Court, W.E. "Root Alkaloids of *Rauvolfia oreogiton*." Planta Med. 26 (1974b) : 170-173.
- Timmins, P., and Court, W.E. "Stem Alkaloids of *Rauvolfia obscura*." Phytochem. 15 (1976a) : 733-735.
- Timmins, P., and Court, W.E. "Further Alkaloids from the Roots of *Rauvolfia obscura*." Planta Med. 29 (1976b) : 283-288.
- Trager, W.F.; Lee, C.M.; Phillipson, J.D.; Haddock, R.E.; Dwuma-Badu, D., and Beckett, A.H. "Configurational Analysis of Rhynchophylline - Type Oxindole Alkaloids. The Absolute Configuration of Ciliaphylline, Rhynchociline, Specionoxeine, Isospecionoxeine, Rotundifoline and Isorotundifoline." Tetrahedron 24 (January 1968) : 523-543.
- Vitayanatpaisan, S. "Alkaloidal Pattern in the Leaves of *Uncaria homomalla*." Master's thesis, Department of Pharmaceutical

Botany, Graduate School, Chulalongkorn University, 1979.

Watt, J.M., and Breyer-Brandwijk, M.G. The Medicinal and Poisonous Plant of Southern and Eastern Africa. Edinburgh and London : E. & S. Livingstone , 1962.

Weisenborn, F.L., and Diassi, P.A. "The Reaction of *Rauwolfia* Alkaloids with Mercuric Acetate. Conversion of 3-Isoreserpine to Reserpine." J. Am. Chem. Soc. 78 (May 1956) : 2022-2023.

Wenkert, E., and Roychuhuri, D.K. "3-Dehydro Derivative of Some Indole Alkaloids." J. Org. Chem. 21 (July-December 1956) : 1315-1317.

Willaman, J.J., and Schubert, B.G. Alkaloid - Bearing Plants and Their Contained Alkaloids. Washington D.C. : U.S. Government Printing Office, 1961.

Wongseripipatana, S. "Alkaloids from *Uncaria salaccensis* Bakh. f. nom provis." Master's thesis, Department of Pharmaceutical Botany, Graduate School, Chulalongkorn University, 1979.

Yeoh, G.B.; Chan, K.C., and Morsingh, F. "Pteropodine and Isopteropodine, the Alkaloids from *Uncaria pteropoda*." Tetrahydron Lett. 9 (March 1966) : 931-938.

Zinnes, H., and Shavel Jr., J. "Yohimbane Derivatives. III. The Oxidative Rearrangement of Indole Alkaloids to Their Spirooxindole Analogs." J. Org. Chem. 31 (June 1966) : 1765-1771.

APPENDIX

Key to the Figs. XIX - XXXVI

- C = purified alkaloidal extract
EI = ether insoluble fraction
ES = ether soluble fraction
M = methyl alcohol fraction
EI₁ = alkaloidal fraction from EI
EI₂ = alkaloidal fraction from EI
TS₄ = isolated specionoxeine
TS₅ = isolated ciliaphylline
Sg = silica gel G
Al = aluminium oxide G

Authentic alkaloids

- 1 = rotundifoline
2 = isorhynchophylline
3 = rhynchophylline
4 = specionoxeine
5 = ciliaphylline
6 = rhynchociline

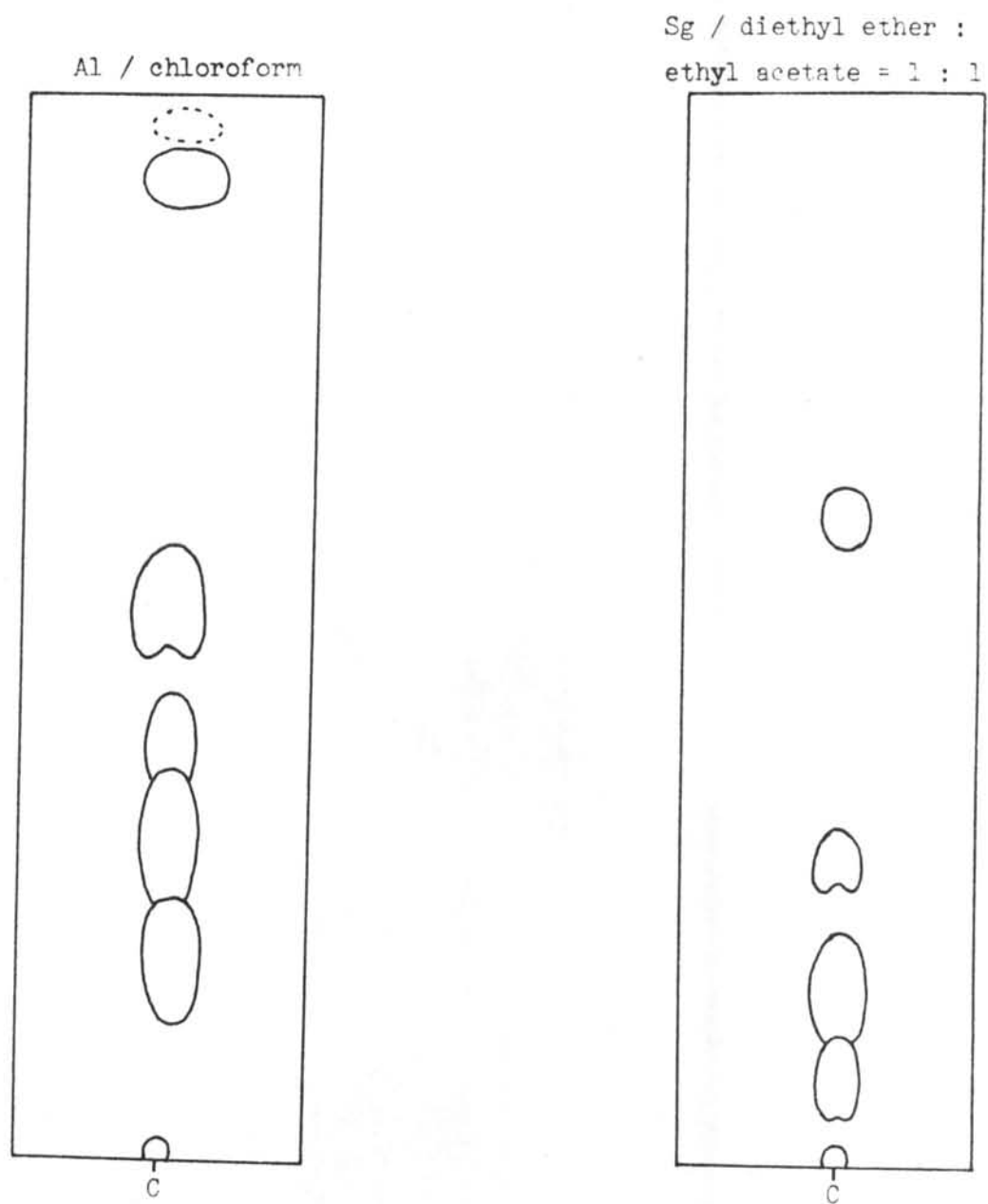
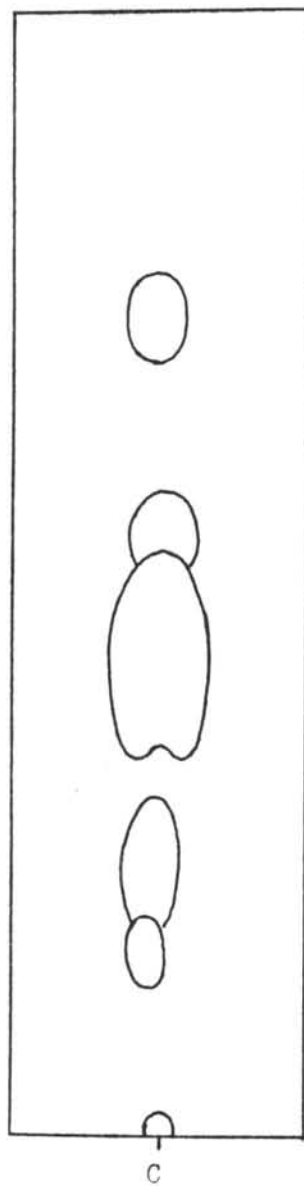


Fig. XIX Thin layer chromatograms of alkaloids.

Sg / chloroform : acetone = 5 : 4



Sg / diethyl ether

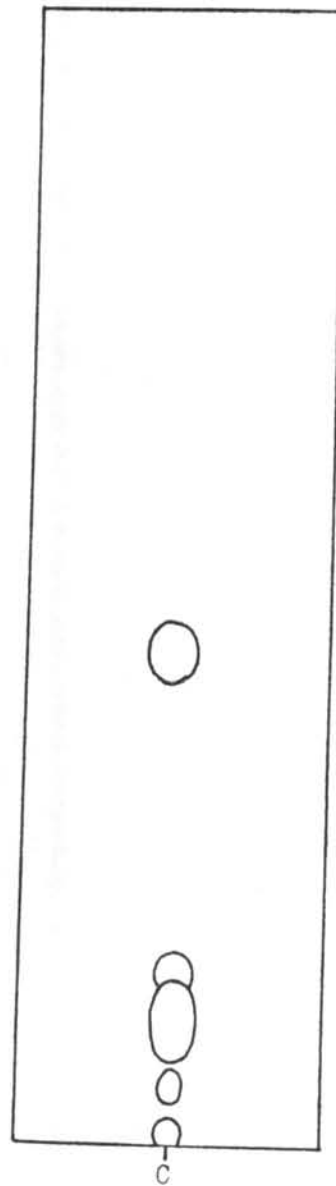


Fig. XX Thin layer chromatograms of alkaloids.

Sg / chloroform : ethyl alcohol = 95 : 5

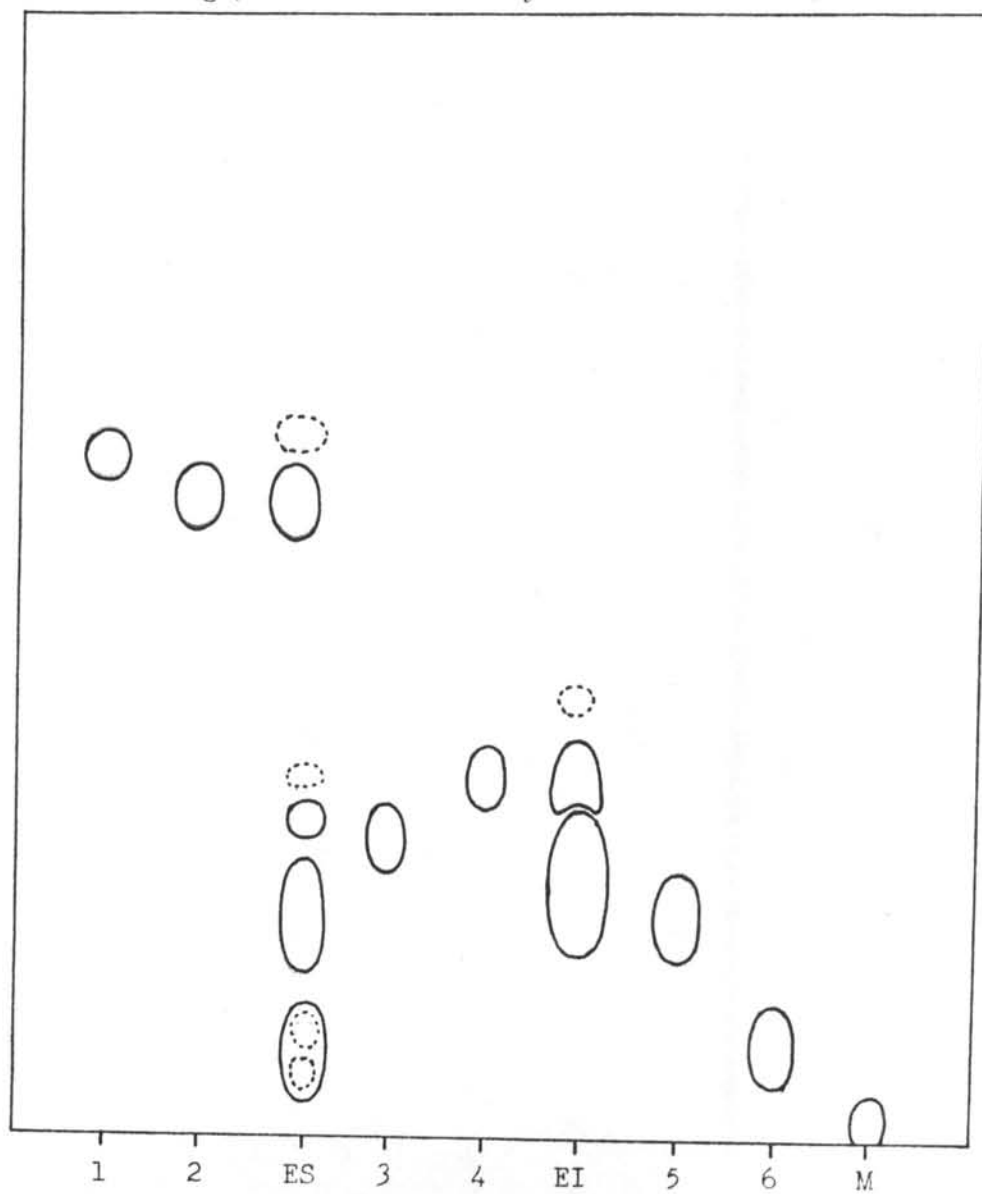


Fig. XXI Thin layer chromatogram of alkaloids.

Sg / chloroform : acetone = 5 : 4

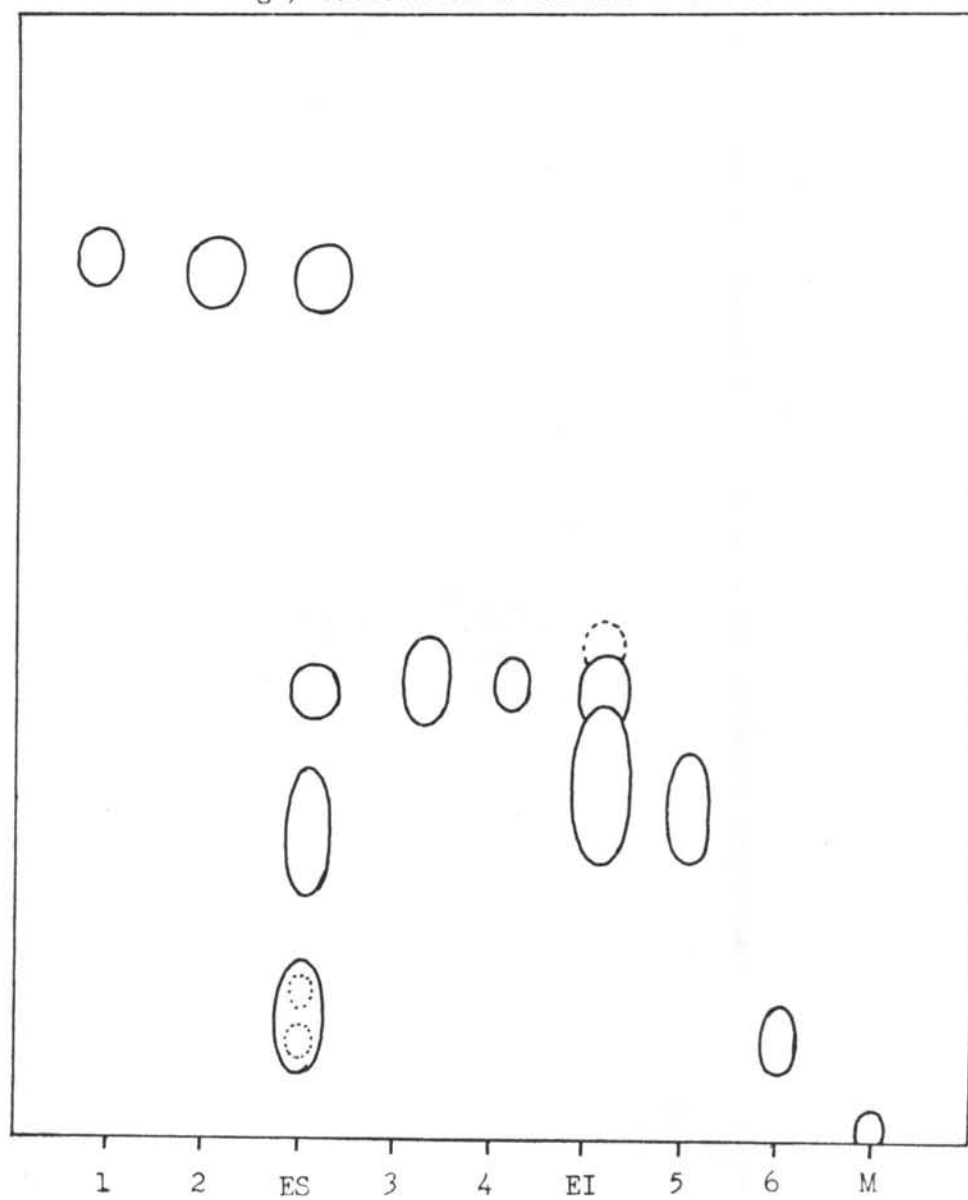


Fig. XXII Thin layer chromatogram of alkaloids.

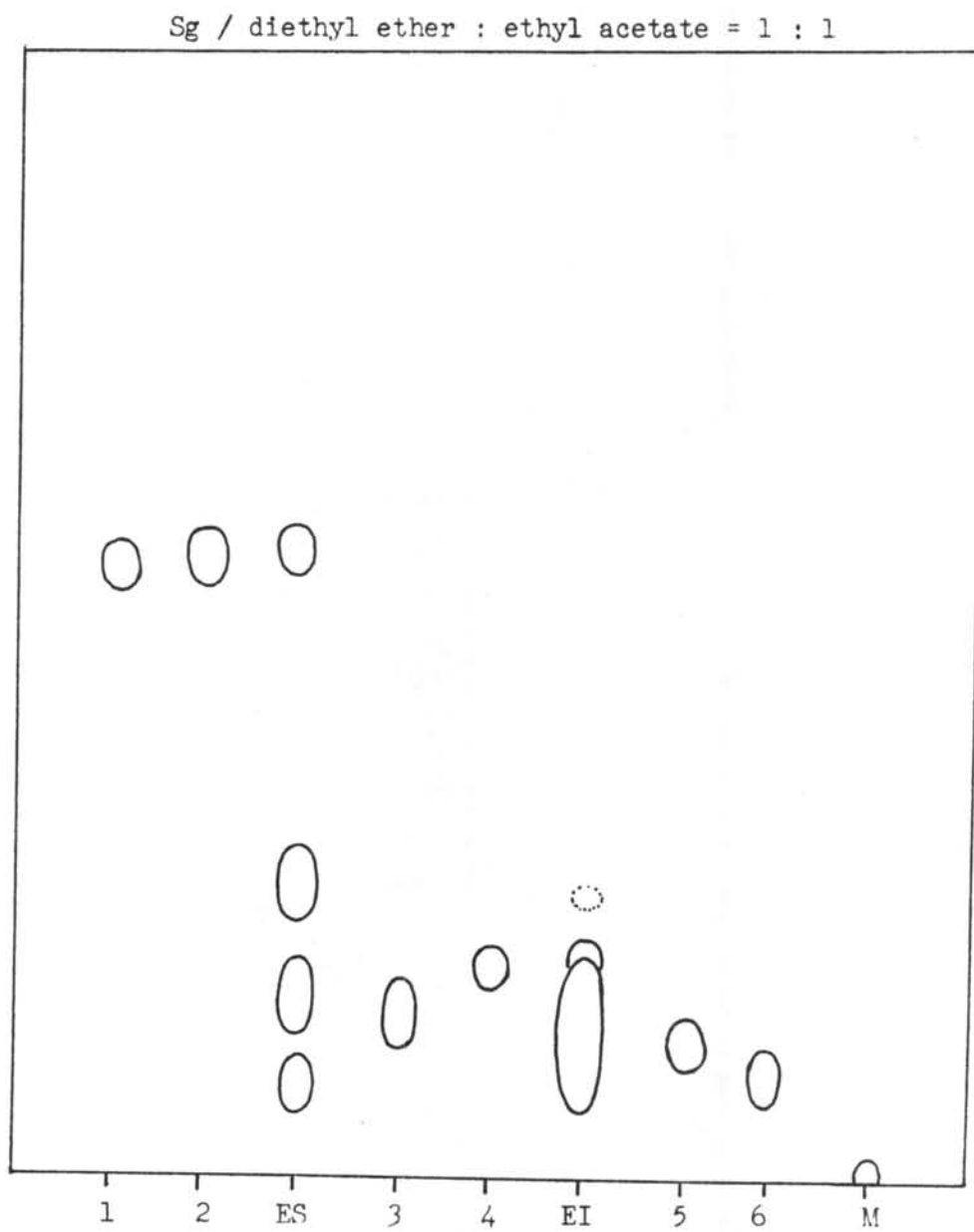


Fig. XXIII Thin layer chromatogram of alkaloids.

Sg / diethyl ether

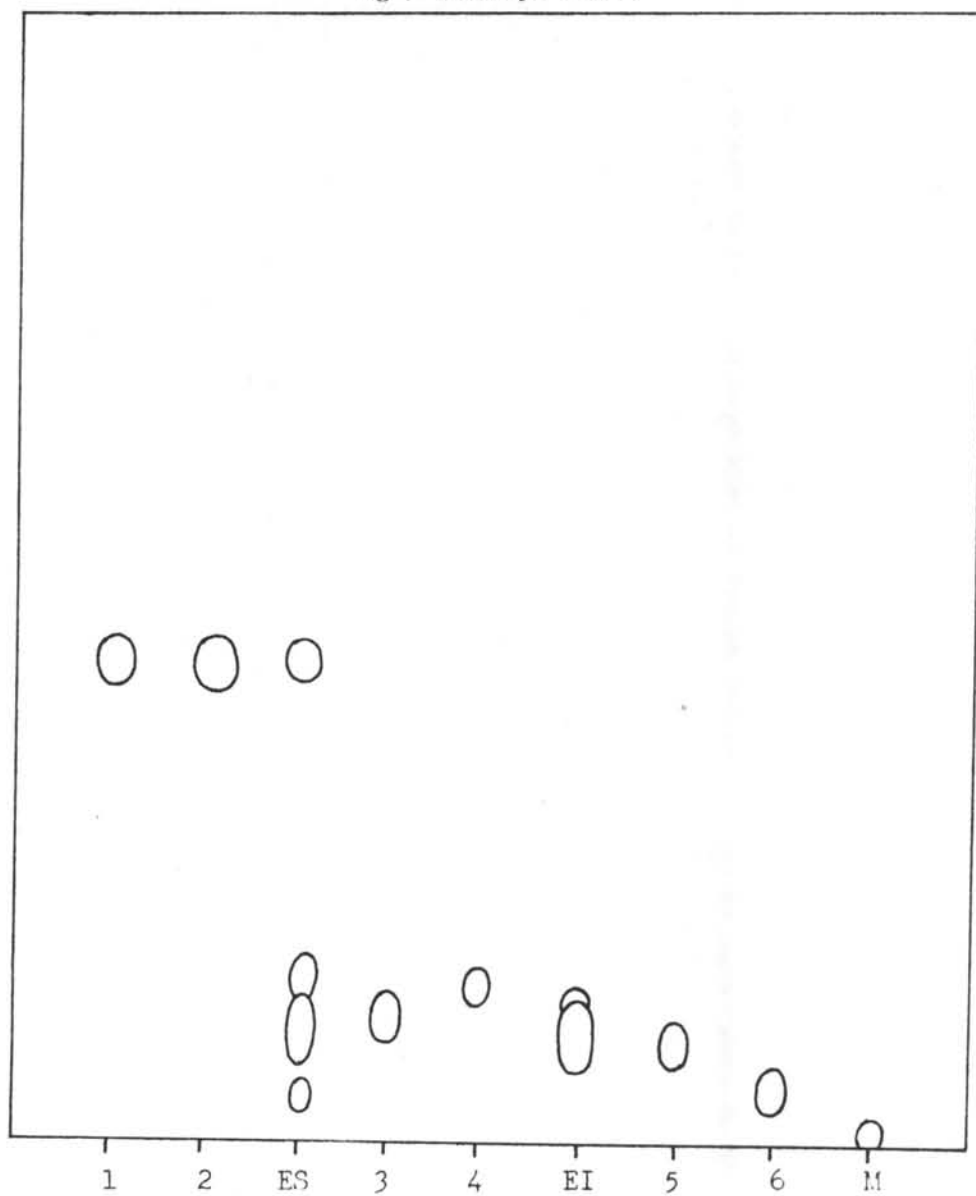


Fig. XXIV Thin layer chromatogram of alkaloids.

Sg / chloroform : ethyl alcohol = 95 : 5

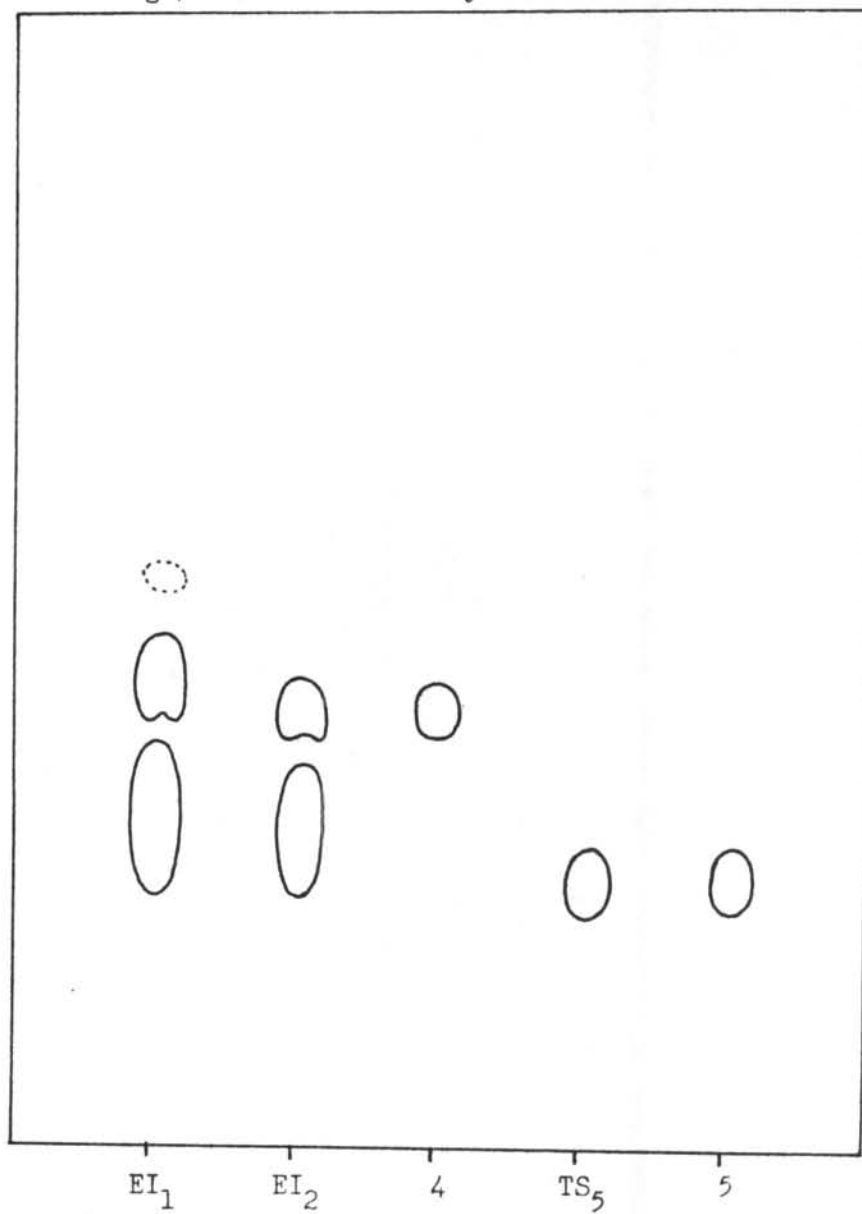


Fig. XXV Thin layer chromatogram of alkaloids.

Sg / chloroform : ethyl alcohol = 95 : 5

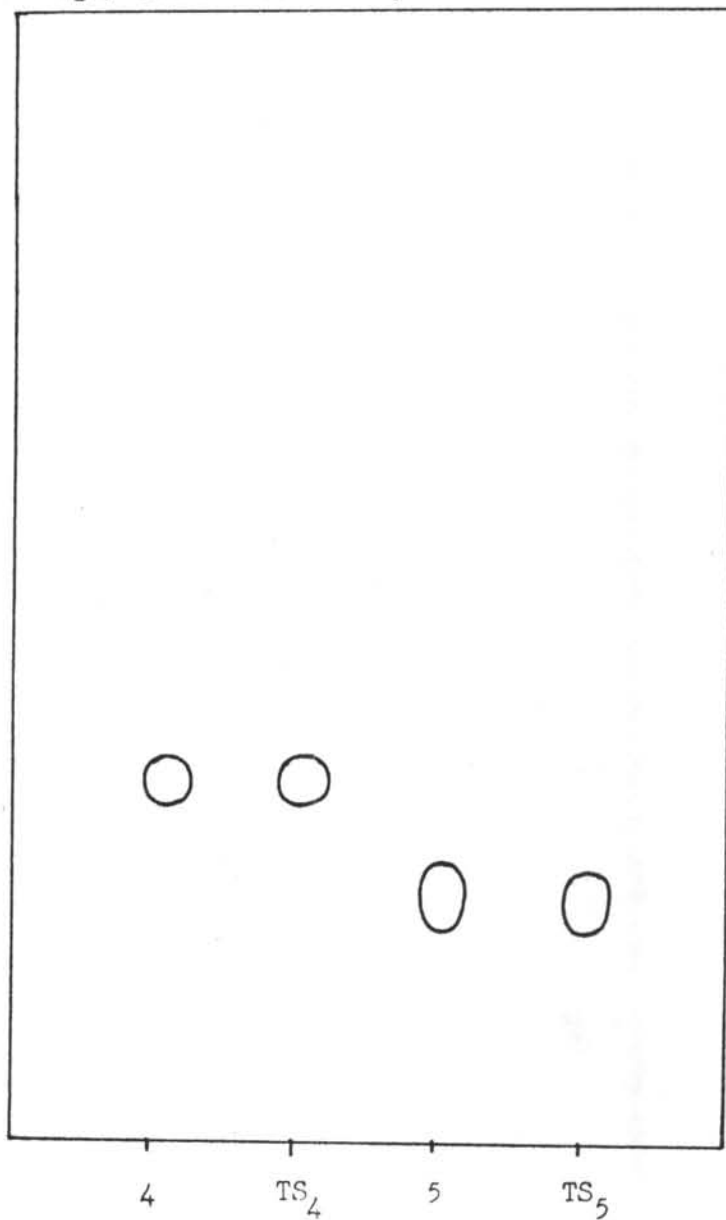


Fig. XXVI Thin layer chromatogram of alkaloids.

Sg / chloroform : acetone = 5 : 4

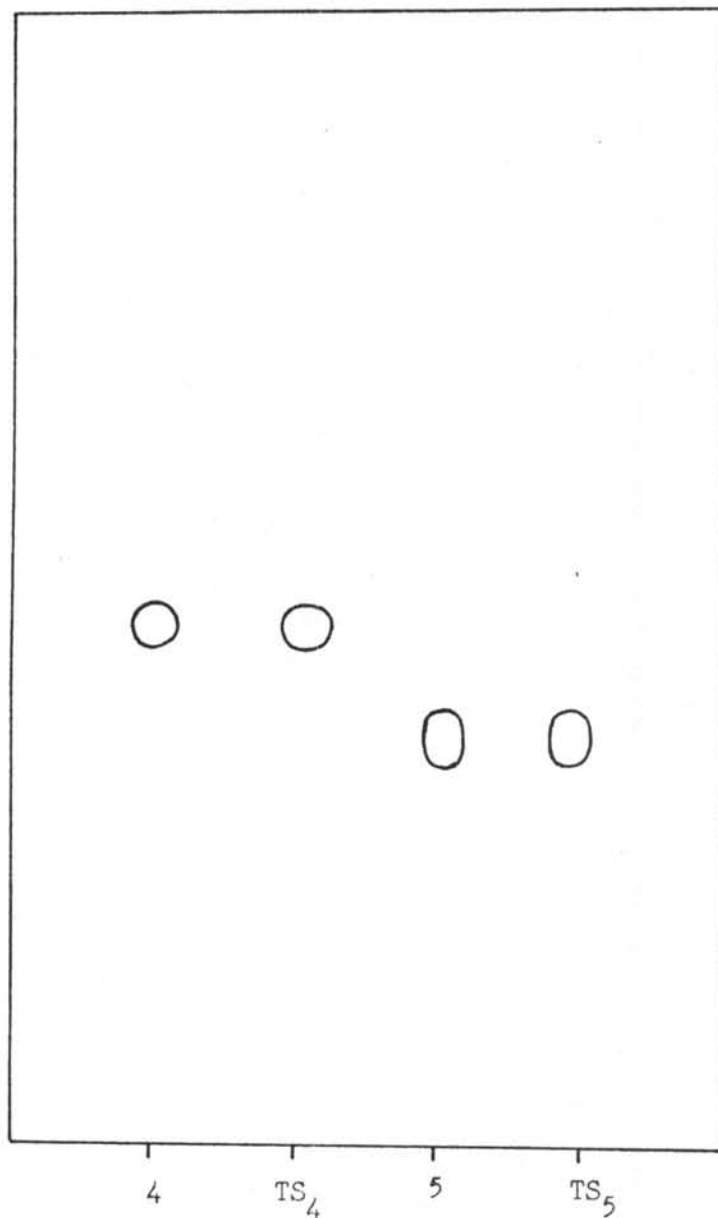


Fig. XXVII Thin layer chromatogram of alkaloids.

Sg / chloroform : ethyl alcohol = 95 : 5

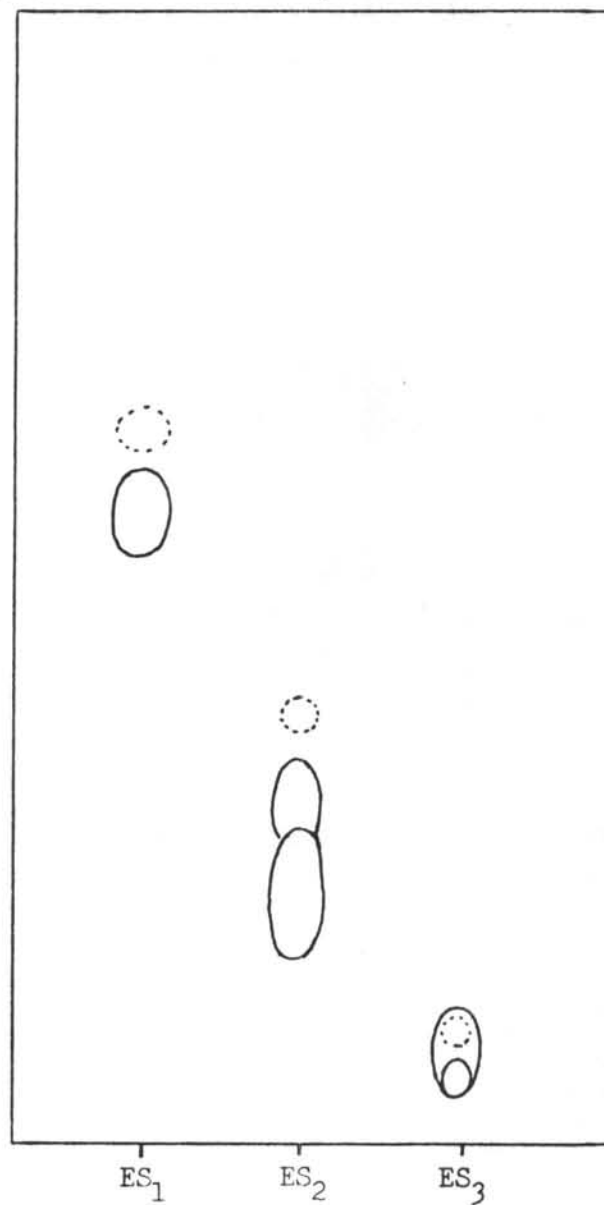


Fig. XXVIII Thin layer chromatogram of alkaloids.

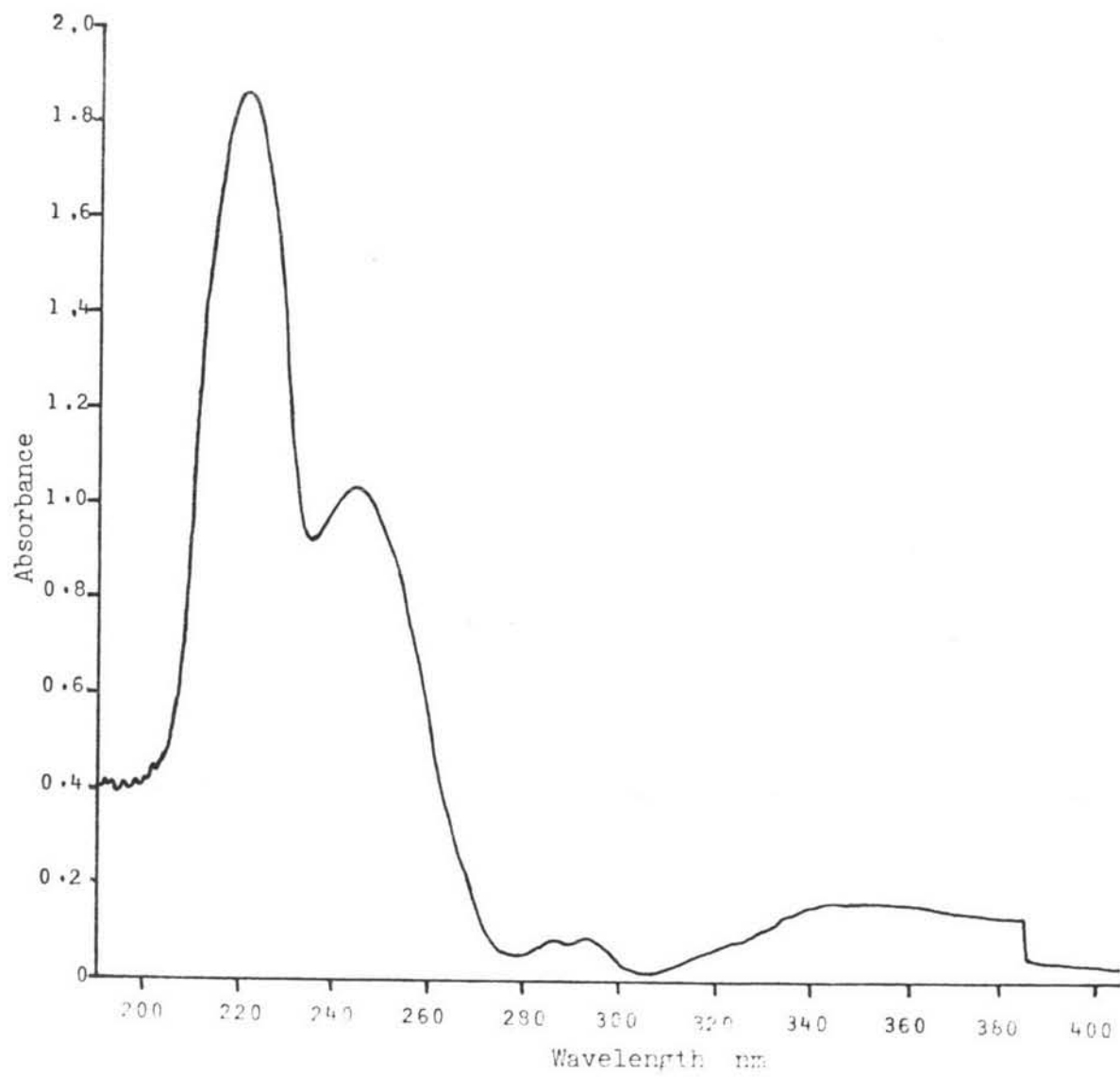


Fig. XXIX Ultraviolet absorption spectrum of alkaloid TS₄ in ethyl alcohol.

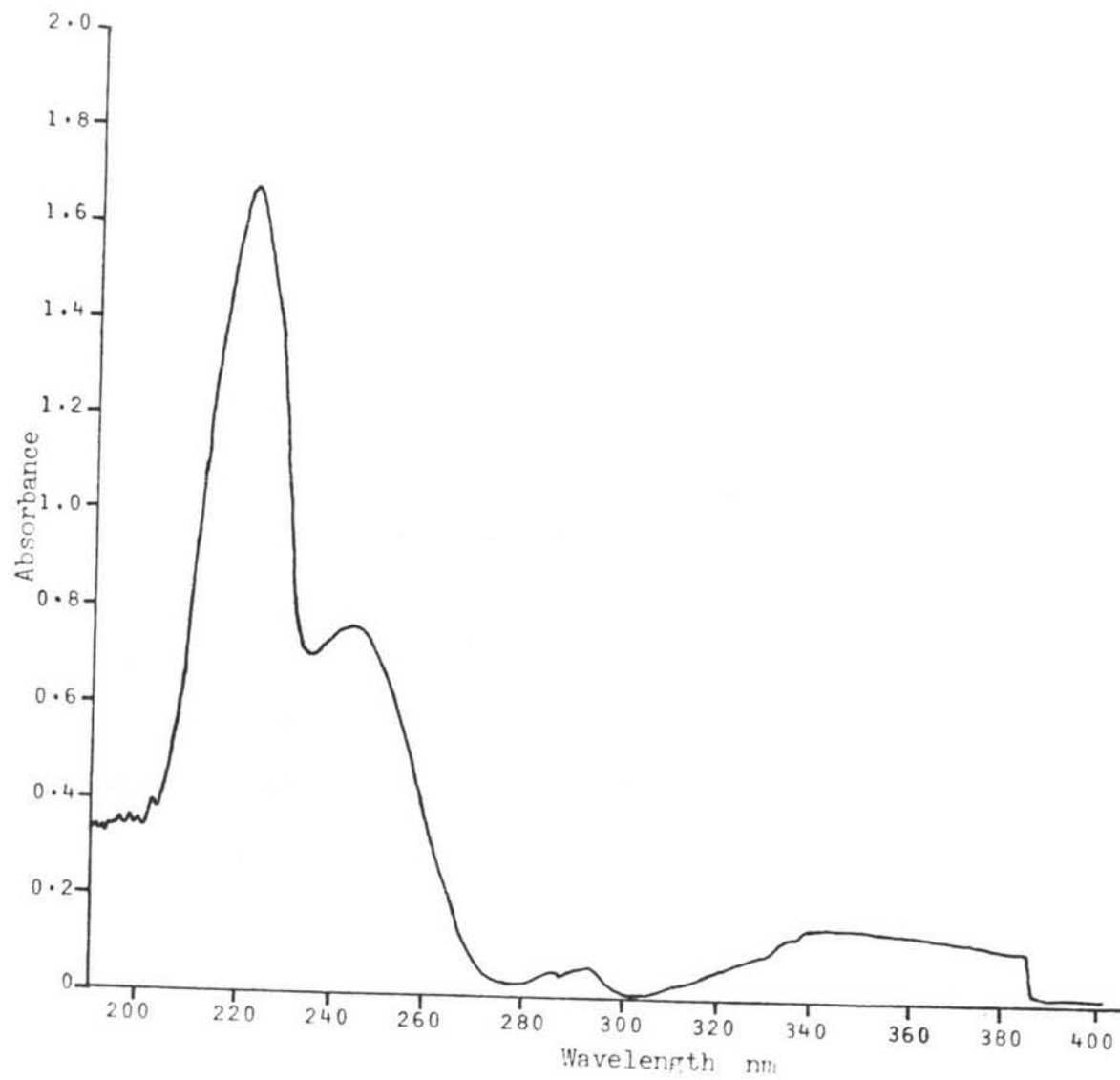


Fig. XXX Ultraviolet absorption spectrum of alkaloid TS₅ in ethyl alcohol.

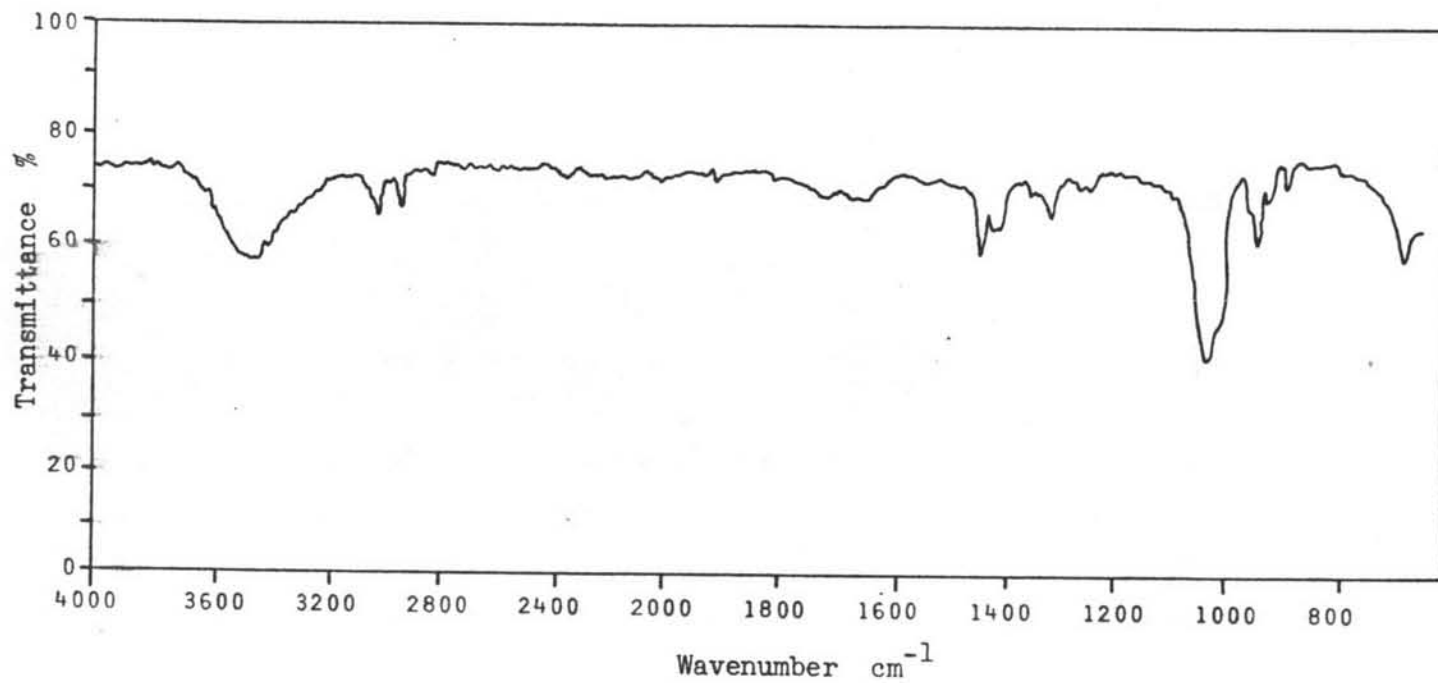


Fig. XXXI Infrared absorption spectrum of alkaloid TS_4 in potassium bromide disc.

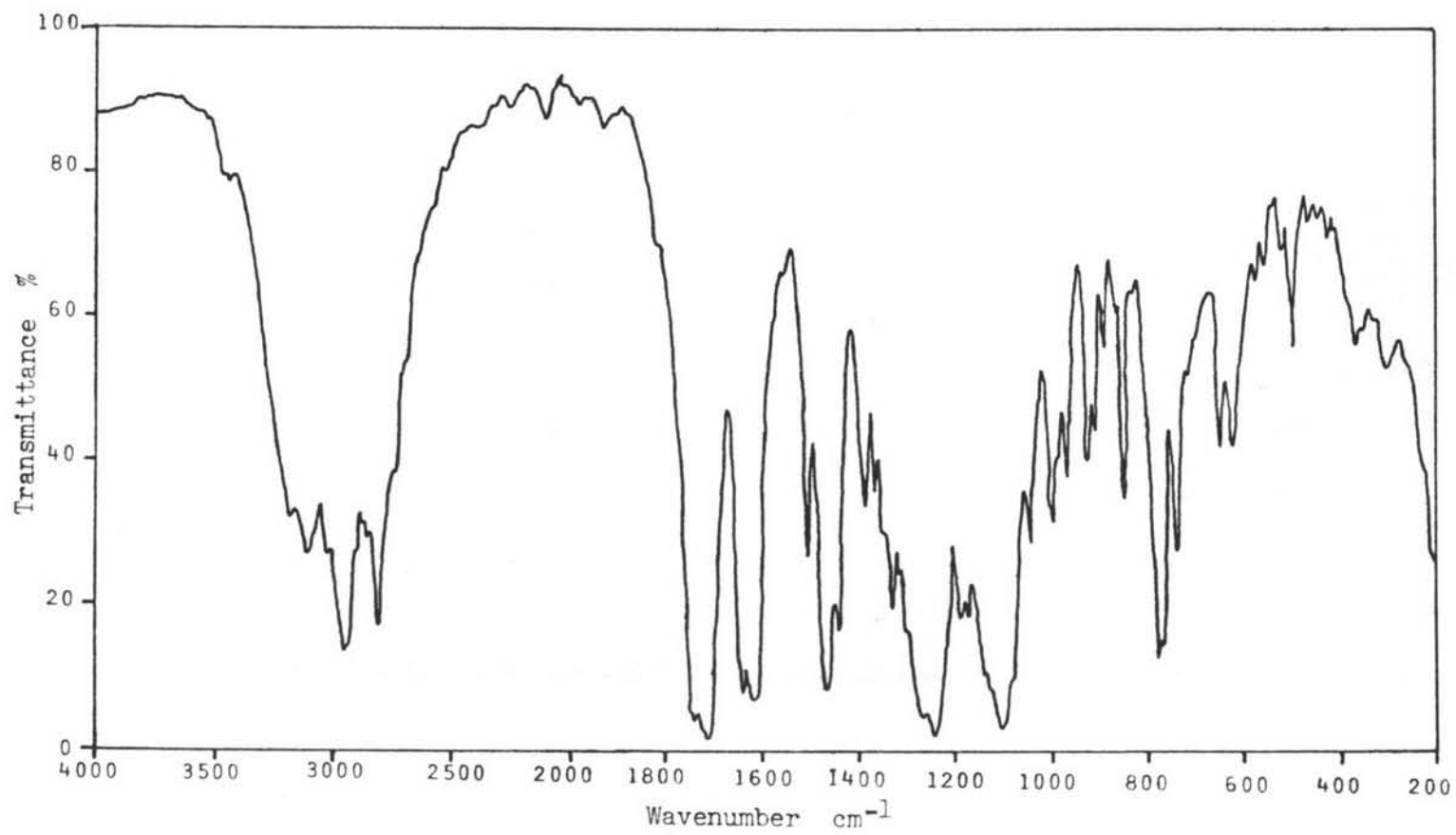


Fig. XXXII Infrared absorption spectrum of alkaloid TS₅ in potassium bromide disc.

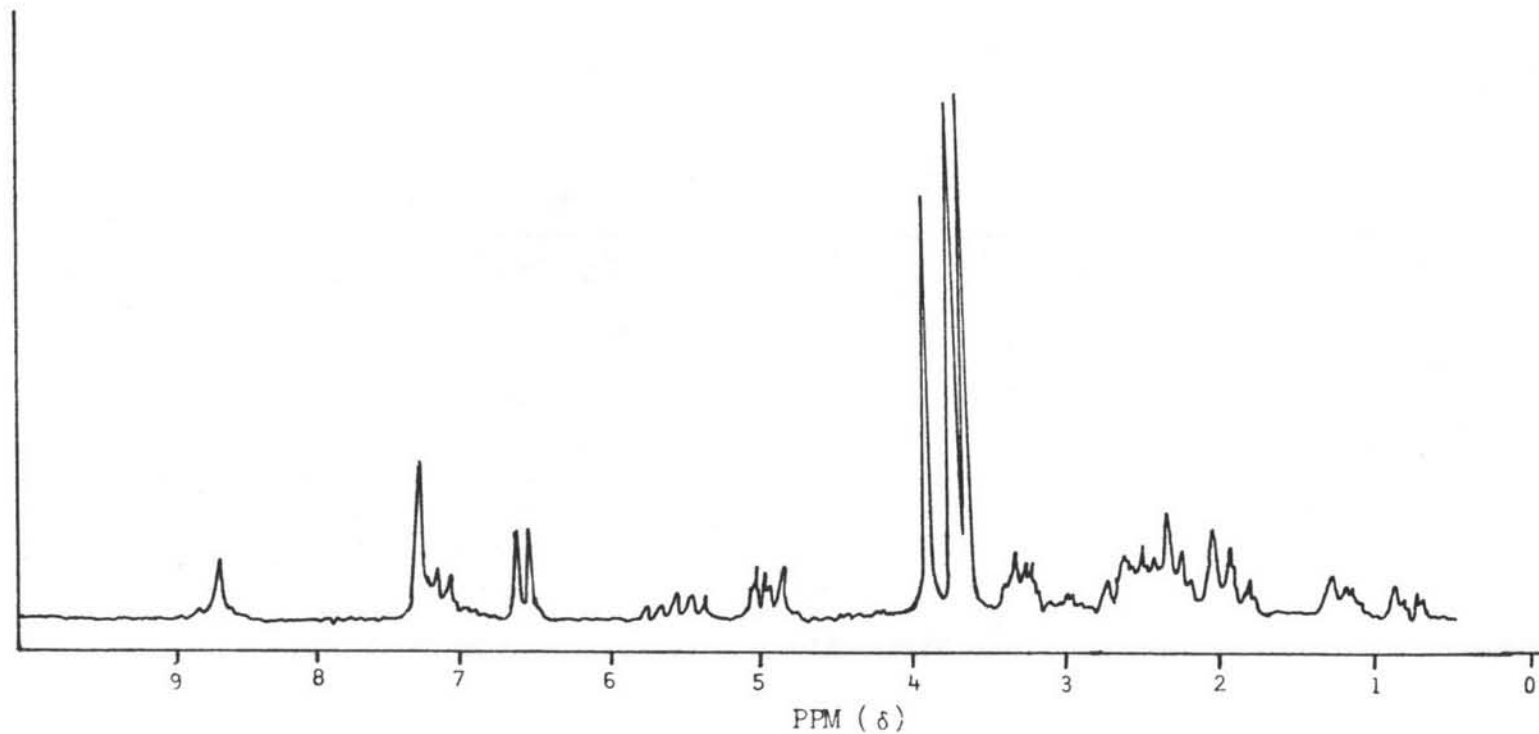


Fig. XXXIII Nuclear magnetic resonance spectrum (CDCl_3) of alkaloid TS_4 .

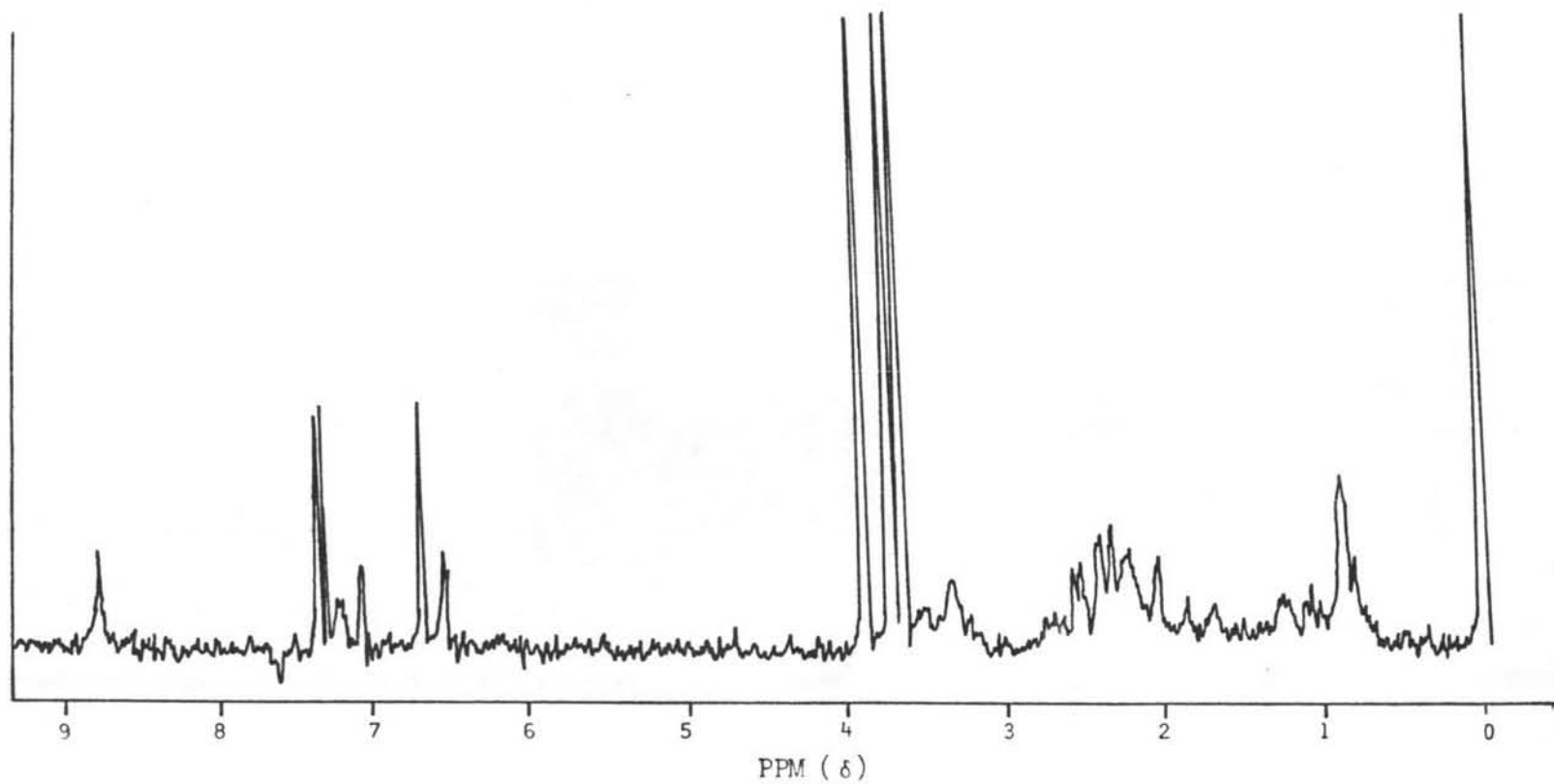


Fig. XXXIV Nuclear magnetic resonance spectrum (CDCl_3) of alkaloid TS_5 .

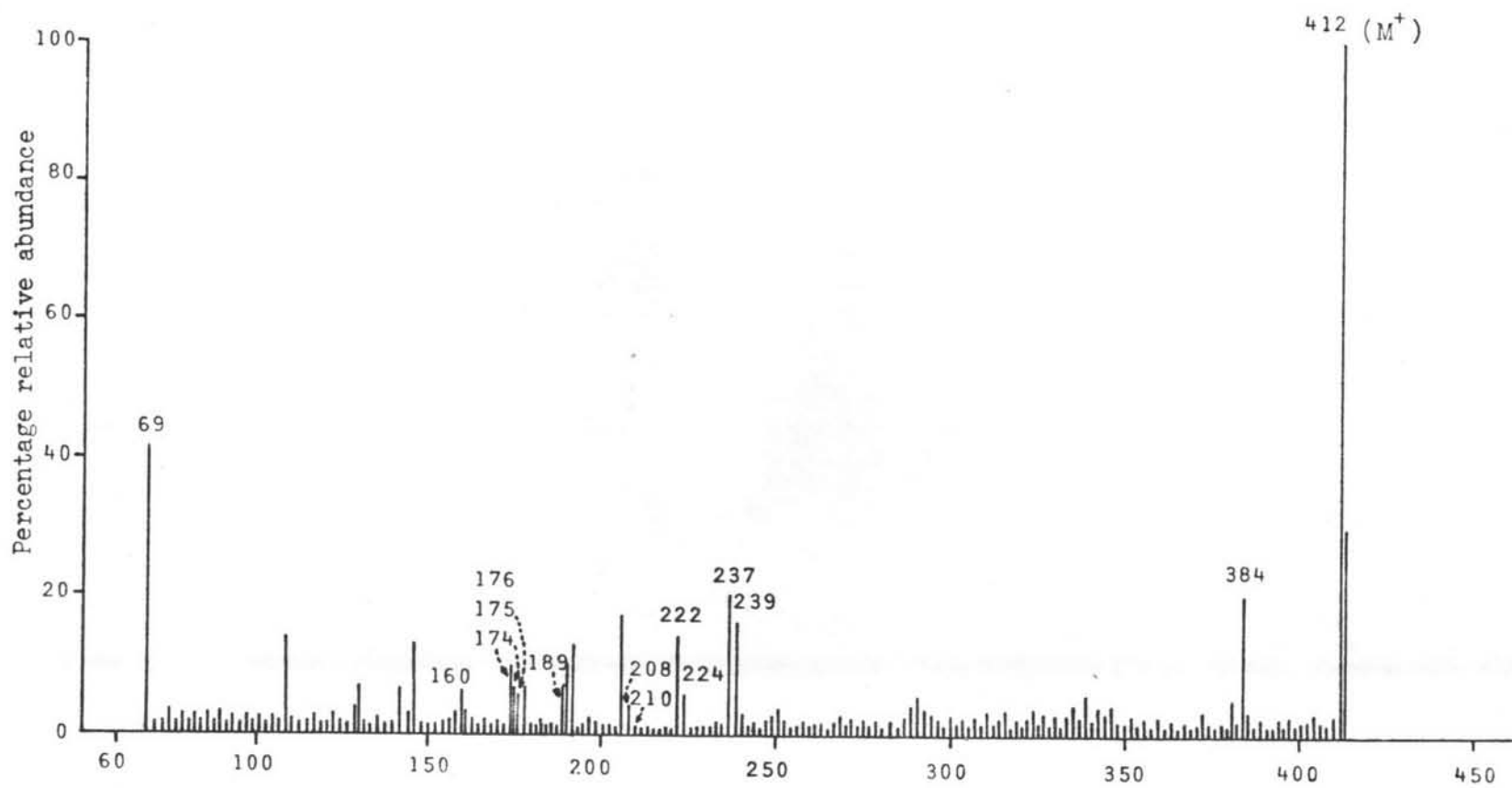


Fig. XXXV Mass spectrum of alkaloid TS₄.

VITA

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