steroids (18) and that of antibacterial agents, fusidic acid, cephalosporin P_1, helvolic acid, and related compounds (19,20) have been reported. Cardiac glycosides[1] (21–24) and steroidal glycosides isolated from starfish (25) also possess antiviral activity. Furthermore, the triterpenoid saponins (X–XIV, XVI, XIX, and XX) found to inhibit influenza virus in the present study were reported to be antibacterial agents (10).

At least one site of action of gymnemic acid A against influenza virus is indicated to be associated with relatively early events in the virus infectious cycle which may involve inhibition of virus–host cell attachment (1). Cardiac glycosides are believed to exhibit antiviral action by competing with infectious viruses for the virus-specific receptor sites on the cell membrane and adenosine triphosphatase molecules involved in virus–host cell interactions (24). The recent observation that gymnemic acid also inhibits adenosine triphosphatase activity (26) suggests that the mechanism of antiviral action of gymnemic acid may be similar to that proposed for cardiac glycosides.

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[1] In our *in vitro* tests, digitonin exhibited 100% inhibitory activity against influenza virus at a concentration of 12.5 μg/ml.

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Trapa bispinosa Starch as a Tablet Disintegrant

Keyphrases □ *Trapa bispinosa* starch—compared to wheat, potato, and maize starch as a possible tablet disintegrant □ Tablet disintegrants—trapa starch compared to wheat, potato, and maize starch □ Disintegrants, tablet—trapa starch compared to wheat, potato, and maize starch

Sir:

Trapa bispinosa (Faln. onagraceae) (1), commonly known as water caltrop or water chestnut, is an aquatic plant which has been grown in India since ancient times at negligible cost. It is widely used as a general article of food and has a palatable taste. It has been reported that the plant nut contains 73% starch. These preliminary data prompted us to study this starch[1] as a tablet disintegrant vis-à-vis other starches currently used.

Starch was isolated by the commonly used water extraction method. Preliminary physical and chemical analysis of trapa starch showed similar characteristics to those of maize starch, commonly used as a disintegrant for compressed tablets. Trapa starch passes all the tests described under the starch mono-

[1] Dr. V. K. Deshmukh, Professor of Pharmacognosy, Department of Pharmaceutical Sciences, Nagpur University, Nagpur, India, identified the plant *Trapa bispinosa* and the voucher specimen is deposited in the laboratory of the Department of Pharmaceutical Sciences, Nagpur University, Nagpur, India.

Table I—Disintegration Time (Minutes) of Prepared Tablets

Substance	Starch Disintegrant	Mean Disintegration Time, 10% Starch	Mean Disintegration Time, 15% Starch
Aspirin	Potato	5.35	6.12
	Trapa	6.49	4.30
	Wheat	7.0	5.20
	Maize	6.0	4.10
Calcium carbonate	Potato	8.1	6.0
	Trapa	8.30	6.0
	Wheat	9.0	8.0
	Maize	7.0	5.0
Sulfathiazole	Potato	4.0	4.3
	Trapa	4.4	3.3
	Wheat	4.56	5.3
	Maize	6.1	4.0
Sodium bicarbonate	Potato	12.2	10.2
	Trapa	12.45	9.2
	Wheat	10.1	13.2
	Maize	9.3	8.3

graph in the India Pharmacopoeia (2). Trapa starch is tasteless, odorless, and white in color with a fine texture. The starch consists of polyhedral or rounded granules about 10–40 μm. The gelatinization temperature of the starch was found to be at 80°, as observed by the method suggested by Radley (3). Chemical studies gave the following results: total reducing sugars, 67.5%; protein, 7.58%; and crude fiber, 2.34%. Identification of sugars was carried out by a paper chromatographic method, and glucose and maltose were identified. Among the metals, iron was detected.

For the present investigation, four starches were selected as tablet disintegrants: trapa, potato, maize, and wheat. By using each of these starches separately, tablets of aspirin, sulfathiazole, calcium carbonate, and sodium bicarbonate were prepared[2]. Granules of calcium carbonate, sulfathiazole, and sodium bicarbonate were prepared by moist granulation, while aspirin granules were prepared by dry granulation. All starches were used in 10 and 15% concentrations. The tablet weight was kept constant at 0.400 g, and the tablet hardness was kept as near to 5.5 kg/cm^2 as possible by a hardness tester[3].

Appearance—All tablets prepared with trapa starch had an excellent appearance and were glossy.

Uniformity of Weight—This parameter conformed to India Pharmacopoeia (2) specifications.

Compression Ratio—The ratio was found to be nearly uniform in all the tablets (4). It ranged from 0.87 to 0.88 for aspirin, from 0.87 to 0.89 for sulfathiazole, from 1.12 to 1.13 for sodium bicarbonate, and from 1.34 to 1.37 for calcium carbonate.

Disintegration Time—The USP XV (5) apparatus and method were used to determine disintegration time. The tablets prepared with trapa starch at 15% concentration showed a remarkable decrease in disintegration time in contrast to other starches at 15% concentration as well as its own 10% concentration. The mean disintegration time of different tablets is given in Table I.

By using an analysis of variance technique, it was observed that at the 1% level of significance the 15% concentration gave lower disintegration times than the 10% concentration for all four starches. By using Scheefe's (6, 7) 95% probability interval estimate, it was observed that tablets with trapa starch had lower disintegration times than those containing potato or wheat starch but greater disintegration times than those containing maize starch.

Thus, trapa starch proved efficient as a disintegrating agent in 15% concentration. The potentialities of starch from *T. bispinosa* as a substitute for currently used starches are considerable.

[2] Tablets were prepared on a Unimake single-stroke, four-punch tablet machine using 0.94-cm (0.37-in.) punches of standard concavity.

[3] Monsanto.

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Binding of a New Antitumor Agent, Thalicarpine, to DNA

Keyphrases □ Thalicarpine (antineoplastic alkaloid)—binding to calf thymus DNA, N—O—O triangulation structure □ Antineoplastic alkaloids with N—O—O triangulation structure—binding of thalicarpine to calf thymus DNA □ Binding of antineoplastic alkaloids to calf thymus DNA—radiolabeled thalicarpine □ Equilibrium dialysis—determination, binding of radiolabeled thalicarpine to calf thymus DNA

Sir:

Thalicarpine (I), a new antineoplastic alkaloid with novel structure, is in initial clinical trial in our service (1).

We previously described the multiplicity of action of thalicarpine against L-1210 mouse leukemia cells in culture (2). We reported that we could not detect any binding of thalicarpine to calf thymus DNA *in vitro* by UV spectroscopy.

We now wish to present evidence for DNA binding