e.g., *Gangamopteris kashmirensis* Seward, *Glossopteris* sp., *Sphenopteris polymorpha* Feist., *Psygmophyllum* sp., and a labyrinthodont, *Chelydosaurus marahomensis Verma*.

Fossil insects have been reported by Handlirsch (1906–08) and Bana (1954) from the Gangamopteris Beds of Risin spur near Srinagar, Kashmir, and have been described under *Gondwanablatta reticulata* Handl., and *Prognoblattina columbiana* Schudder, respectively. The present record is first from the Marahom area.

Generic diagnosis.—Fore-wing elliptical, thrice as long as broad ; costal area narrow and band-like ; sub-costa reaching upto the tip of the wing with about 12 simple pectinate branches ; radius and media strongly developed and each dividing into two branches ; cubitis with 6 alternately simple and compound branches covering from the lower end of the apical margin to the almost entire free margin ; posterior cubitis, or *vena dividens,* strongly convex and lying in a deep groove ; anal area one-third the wing length with a large number of anal veins, all reaching the inner margin.

Brief Description of the Genotype (G.S.I. Type No. 18274).—Fore-wing about 42 mm. long with strongly curved anterior margin and a straight anal margin. Radius strongly developed, convex and bifurcating into Radius 1 and Radial Sector, the former less dominant than the latter. Media likewise dividing into convex Anterior Media and concave Posterior Media, which are further branched into three and two respectively, all the branches reaching the apical margin. Cubitis strongly developed, smoothly curved downwards with six branches, which are alternately simple and forked. Anal area with eight simple as well as compound branches, all sloping regularly to the inner margin. The intercalary venation consisting of a close network of narrow, thin and reticulate veins. The genotype possesses distinctive characters and the author cannot recall any form with which it can be compared. The generic name is after the geologically famous area, Kashmir, and the specific name is after the locality of its occurrence, Marahom.

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MUTATIONAL RECTIFICATION OF SPECIFIC DEFECTS IN SOME POTATO VARIETIES

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THOUGH the early attempts to induce mutations in potatoes did not yield fruitful results,[2] recent investigations have shown that striking variations can be induced by treating the tuber eyes or young sproutlings with ionizing radiations or radioisotopes.[1,3–8,12] It has also been demonstrated that specific defects can be rectified in polyploid plants through induced mutagenesis, since such plants permit chromosome aberrations to pass through the somatic and gametic sieves[11] more readily than diploids. Hence, a study on the induction of mutations was undertaken in Kufri Red and Kufri Sindhuri, two commercially important Indian varieties of potato.

Kufri Red, a clonal selection from Darjeeling Red Round, is capable of giving good yields but has red tubers with deep to medium-deep eyes.[9] Kishore *et al.*[9] pointed out that it would be desirable to get in Kufri Red mutants with white tubers having fleet to medium-deep eyes. Similarly, Kufri Sindhuri, an excellent new variety suitable for cultivation both in the plains and the hilly areas of India, has tubers with red skin and deep to medium-deep eyes.[10] *Virus-free stocks of Kufri Red and Kufri*

Sindhuri kindly supplied by the Director of the Central Potato Research Institute, Simla, were subjected to different mutagen treatments.

The mutagens used were (1) gamma-rays, 6 Kr. and 10 Kr. from a 200-Curie Co^{60} Source, (2) Ultra-violet radiation using a germicidal lamp at 2650 Å for one hour *plus* gamma-rays, 6 Kr. and 10 Kr., (3) radioisotopes—P^{32}, S^{35} and Ca^{45} @ 150μc./tuber or sproutling.

Methods of Treatment.—(*a*) *Gamma-rays*: Each tuber to be irradiated was cut into three pieces from the crown end, out of which one was kept as control and the other two were given 6 Kr. and 10 Kr. doses respectively. The tuber pieces to be irradiated were arranged in concentric circles around the Co^{60} Source in the Gamma Garden.

were separated from each tuber by cutting a small portion off the tuber with the sproutling, care being taken to keep the root system intact. These young sproutlings were then placed for 72 hours in specimen tubes each containing 5 ml. of solution of radioactive isotope (150 μc.). Control seedlings from the same tuber were given the same amount of distilled water. The control and treated seedlings were later planted either in pots or in the field.

Results.—A variety of somatic aberrants was observed in SM_1* and subsequent generations. These included changes in the shape and texture of leaves, and the shape, colour and texture of tubers. The mutations isolated for tuber characters in Kufri Red and Kufri Sindhuri are listed in Table I.

TABLE I

Frequency of occurrence of somatic mutations in Kufri Red and Kufri Sindhuri

Variety	No. of tubers or sproutlings treated	Mutagen used ( )	Altered character	Number of mutants
Kufri red	100	γ-rays	White skin	1
do.	120	UV + γ rays	White skin with medium-deep eyes	2
do.	60	P^{32}	Diffuse pigmentation of tuber	2
do.	60	S^{35}	do.	1
Kufri Sindhuri	150	γ rays	(*a*) White skin	2
			(*b*) White skin with fleet eyes	1
			(*c*) Mericlinal chimera for skin pigmentation	1
do.	120	UV + γ rays	(*a*) Half of the tubers with white skin and the rest with normal skin	1
			(*b*) One tuber white and the rest with normal skin	1
			(*c*) Mericlinal chimera for skin colour	1
do.	60	P^{32}	Diffuse skin colour	2
do.	60	S^{35}	do.	1
do.	60	Ca^{45}	do.	1

* The different clonal generations of treated tubers are referred to as SM_1, SM_2, etc.

(*b*) *Radioisotopes.*—(*i*) *Tuber treatment*: Holes sufficient to hold 5 ml. of the radioisotope solution were made in tubers of uniform size which were then placed in soil with their holes facing up. Five ml. of aqueous solution of the radioisotope were poured into each tuber and the same amount of distilled water into the corresponding controls. The holes were then sealed with cellophane paper and the tubers covered with moist soil. The field was irrigated prior to planting and further irrigations were given only after a month. (*ii*) *Sproutling treatment*: The method of Swaminathan[12] was used. Healthy tubers were allowed to sprout in wooden boxes filled with sand. Five to seven sproutlings emerged from each tuber. When about two weeks old, the sproutlings

The tubers of Kufri Red and Kufri Sindhuri with white skin and fleet eyes bred true for these traits. They are being multiplied for the assessment of their yield potential in comparison with the parent strains. Several genetic factors are involved in the control of pigment formation and eye characters in potato.[13-6] Further studies would hence be needed to ascertain the nature of the genetic change responsible for the somatic mutations isolated during the present study.

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PRELIMINARY STUDIES ON THE EFFECT OF CHOLINE CHLORIDE ON BLOOD COAGULATION

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CHOLINE chloride has been extensively used as a constituent in high fat atherogenic and thrombogenic diets.[1-4] Howard and Gresham[3] also observed that the ability of a fat to produce thrombosis was enhanced by the addition of choline chloride. However, coagulation studies, carried out in rats maintained on such regimens, revealed that the prothrombin time was shortened on one hand and the thromboplastin generation time prolonged[5] on the other, and the blood rendered less coagulable than normal.[6] No satisfactory explanation for these opposing effects was given. Since choline chloride was common in all these studies and its effect on blood coagulation was not fully known, a preliminary study in this direction was undertaken.

The experiment was conducted on 36 normal, male albino rats of C.D.R.I. colony of average weight 120 g. Blood of 6 rats was utilised for *in vitro* study and the remaining animals were divided into 5 groups of 6 each and used for *in vivo* study. Group I was used as normal control. Each animal of Groups II, III, IV and V was forced fed a single dose of 100 mg. choline chloride dissolved in 2 ml. of distilled water and coagulation studies in each group performed at ½, 1, 2 and 4 hours respectively. The animals were put under light ether anæsthesia and blood withdrawn directly from abdominal aorta in a glass syringe, kept in oxalated bottles and plasma separated.

To test the coagulation mechanism, calcium clotting time, prothrombin time and fibrinolytic activity of plasma were performed in all the groups. Calcium time was done as described by Dacie[7] and prothrombin time by Quicks' one stage technique,[7] using 0·01% solution of Russel's Viper venom in place of brain extract. Calcium time and prothrombin time techniques were modified as described earlier (Srivastava, *et al.*[8]) in case of *in vitro* tests in which 10%, 25%, 50% and 100% solution of choline chloride were added to the clotting mixtures. Fibrinolytic activity of plasma was done as reported earlier.[8]

Table I shows the mean values of *in vitro* tests.

It is seen that both calcium time and prothrombin time became markedly prolonged when a 10% solution of choline chloride was added to the clotting mixture. With 25% solution, the clotting times registered further prolongation until in 50% and 100% solutions the clotting was either totally inhibited or greatly retarded upto a period of 2 hours. These observations showed that choline chloride interfered with the normal coagulability of blood *in vitro*.