its basal Rudraprayag Formation in the Alakananda Valley show the original reflected Aravalli trend (NE-SW) and the NW-SE oriented poorly developed linear and planar structures are superimposed on the NE-SW trend. This is also supported by the iso-
clinally folded quartz veins on the S<sub>1</sub> surface of the massive penecontemporaneous lava beds and lime-
stone with a plunge perpendicular to the NE-SW (or parallel to NW-SE) and the S<sub>2</sub> structures are parallel to the typical Himalayan trend (NW-SE) which is S<sub>1</sub> in the Naini Group. This indicates that the Himalayan trend has produced a cross foliation or 
foliation superimposed on the S<sub>0</sub> (NE-SW) of the Garhwal Group rocks in the Tertiary tectonic move-
ments. The stromatolites and other primary sedimentary structures support that the rocks are in 
normal disposition in this area.

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SEPARATION OF AUXIN PROTECTORS FROM 
ZIZYPHUS GALL TISSUE BY SEPHADEX GEL 
FILTRATION

Auxin protectors are considered to be the regulatory substances in controlling the levels of endogenous 
IAA. They prevent peroxidase-catalyzed oxidation of IAA by inducing a lag period, rather than changing the rate of oxidation. Auxin protectors are found in juvenile tissue, in wounded tissue, and in crown-
gall tumor tissue. The relationship between habituation and the appearance of auxin protectors in cultured 
tobacco cells has been reported. Recently Stomier et al., have described the masking of peroxidase-
catalyzed oxidation of IAA in Vigna by auxin protec-
tors and a rapid method for removing most of the 
auxin protectors. In the present communication the 
separation of auxin protectors from a mite induced 
gall is reported.

Fresh tissues from Zizyphus jujuba Lamk. normal 
stem and stem galls incited by a mite, Eriophyes 
centuris Mass, and tissue cultures obtained from 
the same were used in the experiment. The tissues 
were isolated and grown on modified Murashige and 
Skog medium and used in their third week of 
growth. Tissue extracts were obtained by grinding 
5 g each of the tissues mentioned above in 20 ml of 
cold 20 mM potassium phosphate buffer at pH 6.1. 
These were filtered through cheese cloth, and centri-
fuged for 15 min at 12,000 r.p.m. at 4°C. The superna-
tants were stored at −15°C. The separation of 
auxin protectors was carried out basically by the 
method of Yoneda and Stomier. Dextran gels 
Sephadex G-200, G-50, and G-15 were used to filter 
the extracts. In chromatographic columns (15 × 300 mm), the Sephadex was layered up to 250 mm 
and flushed with phosphate buffer at a rate of 0.12 ml/ 
min in the case of Sephadex G-200 and 0.33 ml/min in 
the case of Sephadex G-50 column. One ml of the tissue 
extract was loaded on the top of the column. The 
column filtrate was collected serially as 5 ml fractions.
Dextran Blue 2000 and Pyronin G, with a molecular 
weight of about 2,000,000 and 300, respectively, were 
used as dye markers to delimit molecular weights. 
One ml of Dextran Blue was added to the extract as a 
0.15% solution in buffer. Pyronin G was added 
only on a Sephadex G-50 column as one ml of a 
0.005% solution as soon as the extract had entered 
the gel.

As shown in Fig. 2, two peaks of protector (Pr) 
activity in terms of lag in IAA oxidation, in extracts of 
both in vivo and in vitro gall tissues, were obtained 
with Se-hadex G-200 filtrates. PR-I, the larger 
peak (around fraction 7), was light brown in colour 
and its molecular weight exceeded 200,000 daltons, 
since it migrated as rapidly as the high molecular weight marker—Dextran Blue that appeared in frac-
tions 5 and 6. Colourless PR-II, the smaller peak 
(around fraction 18), on the other hand, migrated 
more slowly in Sephadex G-200. In Sephadex G-50 
that PR-II, the larger peak (around fraction 8), moved 
as rapidly as the high molecular weight marker— 
Dextran Blue (fractions 5 and 6) is indicative of having 
a molecular weight approximately 10,000 daltons. In 
Sephadex G-50 eluates, the smaller peak Pr-III moved slowly and appeared around fraction 12 followed by 
low molecular weight marker-Pyronin G which 
appeared in fractions 14, 15 and 16. On the other 
hand, colourless Pr-III moved very rapidly through 
Sephadex G-15 column, suggesting its molecular 
weight to be approximately 2,000 daltons. With
The protein content per gram fresh weight of the tissues were: \textit{in vitro} normal (100.5 mg) and gall (162.6 mg); \textit{in vivo} normal (194 mg) and gall (468 mg). The reaction mixture used to assay auxin protectors consisted of a mixture of 2,4-dichlorophenol, MnCl\textsubscript{2}, and IAA each at a final concentration of 0.1 mM and horseradish peroxidase (HRP) at a final concentration of 0.25 mg/ml in 20 mM phosphate buffer, pH 6.1. To this reaction mixture 0.2 ml of Sephadex filtrate was added from each fraction before the addition of HRP. The final volume of the reaction mixture was made to 10 ml. Destruction of IAA was followed by removing 0.5 ml samples from the reaction mixture at various time intervals and assaying by mixing with 2 ml of Salkowski reagent. After one hour the absorbance of the mixture was measured at 530 nm.

Sephadex filtrates of normal tissue extracts, the oxidation of IAA proceeded in the normal way.

On the basis of the results presented, it can be concluded that \textit{Zizyphus} gall tissues contained three substances or the polymers of the same substance which prevented IAA destruction by the enzymes normally found in the stem tissues. Preliminary studies suggest that the active site of auxin protectors is o-dihydroxyphenol. The presence of high levels of auxin protectors could lead to auxin autotrophy and hyper-auxinility found in \textit{Zizyphus} gall tissues.

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