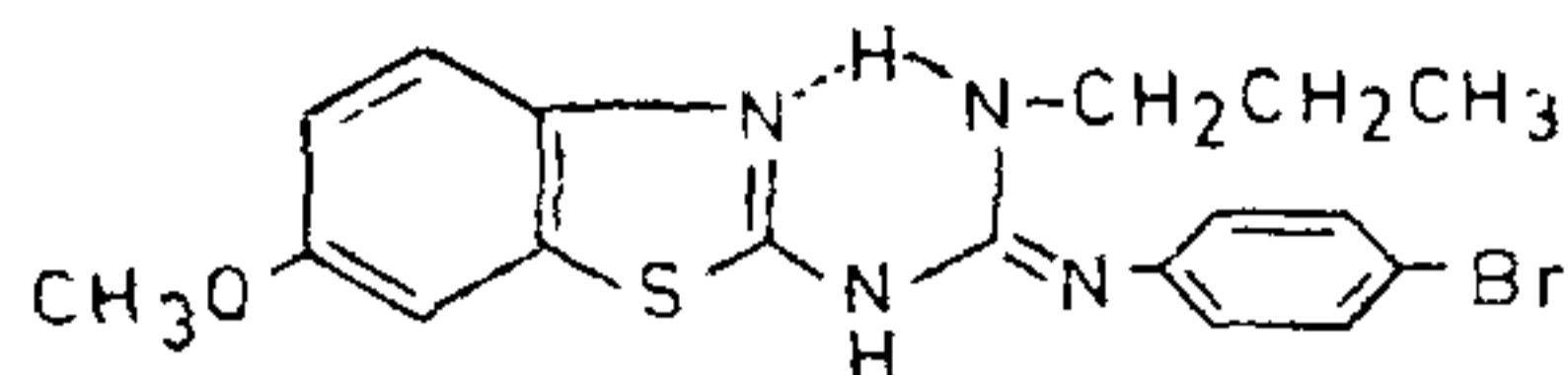since the structure I is more stable by a more effective conjugation of the planar six-membered ring formed by the hydrogen bonding. The strong IR peak at


(III)

Screening Results.—The microbiological and pharmacological activities of these compounds were carried out at Bristol Laboratories, Syracuse, New York, U.S A. These compounds were found to be inactive microbiologically but showed remarkable pharmacological activities. Most notably, N-*p*-bromophenyl-N′-(6-bromo) benzothiazol-2-yl-N′′-(*n*-butyl) guanidine showed CNS depressant, muscle relaxant and anticonvulsant (protection *vs.* electroshock) as given below :

S. No.*	Area	Micro-biological	Pharmaco-logical	MFD/MIC	Species
8	Central Nervous System (CNS)	None	Behav. Dep. Muscle Relax. Electroshock	160 mg/kg po 160 mg/kg po 160 mg kg po	Mouse

MED = Minimum effective dose; MIC = Minimum inhibitory concentration.
*S. No. corresponds to the S. No. of the compound in Table II.
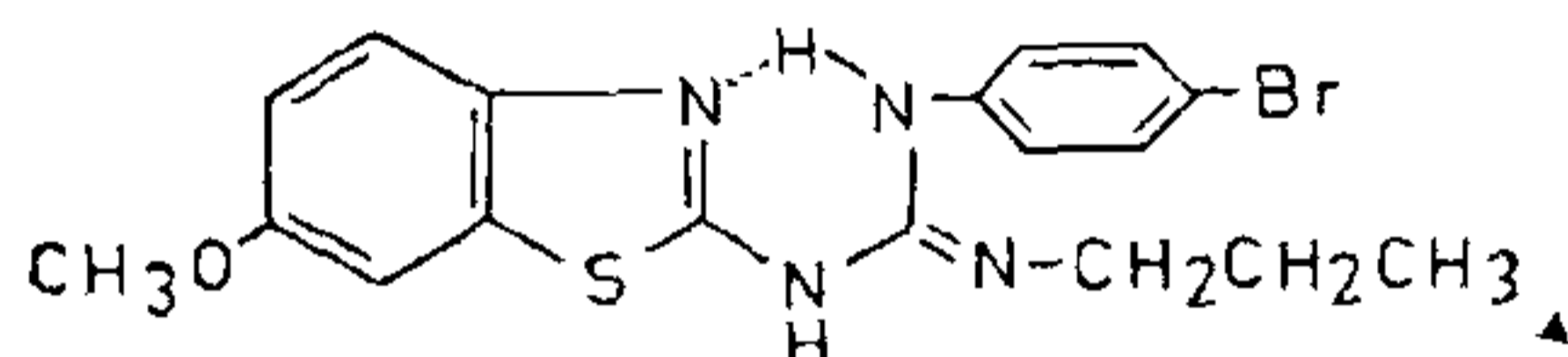
(IV)

1600 cm⁻¹ which is characteristic of an aromatic type $-C=N-$bond also support the above structure for the compound.

The PMR spectra of the compound 2 in $CDCl_3$ also shows along with other normal peaks a multiplet type band at $\delta\,3\cdot47$ for the $-NH-CH_2-CH_2-$ protons which on D_2O exchange changes into a triplet ($J=7\cdot00$ Hz). These facts, therefore, also support the structure for the compound 2 having a skeleton of type I. The strong IR peak at 1595 cm⁻¹ is also in agreement to its structure.

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OBSERVATIONS ON HORNBLENDE PORPHYROBLASTS IN BASIC GRANULITES AROUND BARAMBA, ORISSA

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OCCURRENCE of hornblende porphyroblasts in basic granulites around Baramba (20° 27′ 30″ to 20° 25′ N ; 85° 20′ to 85° 23′ E), hitherto not reported, is recorded here for the first time.

Basic granulite with porphyroblastic hornblende is sporadically exposed in the close vicinity of the non-porphyroblastic varieties¹, both types of basic rock being associated with typical Eastern Ghat rocks. These two varieties are seen in outcrops separated by soil but they can be mapped as single unit based on their field occurrences and absence of lateral variation between the two types.

Porphyroblasts of hornblende (Fig. 1) occur as euhedral to anhedral crystals with sharp outline

and varying in length from 1 cm to 6 cm and width of 1–2 cm. The groundmass shows granulitic texture with plagioclase (andesine-labradorite), pyroxenes, hornblende, quartz, biotite and opaque minerals. Pink garnets have profusely developed in a few cases. Hornblende in groundmass is less in the basic granulite where porphyroblasts are developed.

FIG. 1. Specimen showing hornblende porphyroblasts in basic granulite (dark areas are the porphyroblasts and the rest groundmass)—traced from original specimen.

The porphyroblasts. having the same optical characters as the hornblende in groundmass, are characterised by pleochroism (X—yellowish green, Y—green, Z—greenish brown ; $X < Y < Z$); $2V_e = 78°$ to $84°$; $Z \wedge c = 13°$ to $18°$. Both the types of hornblende are secondary. The hornblende porphyroblasts contain numerous inclusions of pyroxenes. plagioclase. garnet and ore minerals. Both the variety lack any preferential orientation. The plagioclase and pyroxene inclusions in the porphyroblasts have the same optical characters as those in groundmass, as well as in the non-porphyroblastic variety. The cleavage planes of the porphyroblast are oblique to those of the included pyroxenes. The pyroxene inclusions have no definite alignment but in few cases the cleavages are parallel.

Hornblende bearing basic granulites invariably contain pyroxenes, whereas a rock with only hornblende (*i.e.*, without pyroxenes) was not traced. Rather, rocks with pyroxenes, lacking in hornblende, were common. Absence of any rimmed structures of hornblende around pyroxenes, inclusions of pyroxenes in hornblende and its (hornblende) growth following the fractures suggest that it has been formed later by metamorphism.

The occurrence of porphyroblasts may be relegated to one of the following possibilities :

(1) A porphyritic basic intrusive later on metamorphosed.

(2) Porphyroblastic growth by metasomatism.

(3) Segregation by metamorphic differentiation.

Field evidences reveal that there is no lateral variation between basic granulites and porphyroblastic varieties. Absence of relict porphyritic texture or corona structure and the comparability in the grain size of hornblende and pyroxenes occurring in groundmass rule out the possibility of the first two hypotheses mentioned above. Of course, the fact that the laws of metasomatism play a role during metamorphism as envisaged by Turner and Verhoogen[2] cannot be ignored. But Turner and Verhoogen[2] and Ramberg[3] are of the opinion that the growth of porphyroblasts is the result of metamorphic differentiation. As such in the present case the formation of porphyroblasts may be attributed to segregation of hornblende grains by metamorphic differentiation which is evidenced by the lack of any original phenocrysts of either pyroxenes or hornblende, presence of a few or few hornblende grains in the groundmass, presence of quartz at the contact of porphyroblast, growth of hornblende along the fractures of pyroxenes, porphyroblasts enclosing virtually all other minerals, even garnet, and finally absence of any corona structure.

Hornblende might have developed due to the interaction of plagioclase and pyroxene[4] under suitable P–T environment. Release of silica attested by occurrence of quartz along the contact of porphyroblast and presence of pyroxene and plagioclase inclusions in hornblende go in favour of the above reaction. The modal composition of four basic granulites (A—non-porphyroblastic without hornblende, B and C—non-porphyroblastic with hornblende. D—porphyroblastic) of the area represented in Table I, reveals that with the increase of hornblende, percentage of plagioclase and pyroxene decreases. This clearly indicates that hornblende has formed at the expense of plagioclase and pyroxene.

TABLE I

	A	B	C	D
qz	x	x	x	1·47
or	1·96	2·31	x	x
plag	47·79	42·71	41·05	38·55
pyr	46·79	40·15	37·81	25·87
Horn	x	10·81	18·19	28·59
gar	x	x	x	0·23
others	3·46	4·01	2·93	5·28

Evidences for primary hornblende could, therefore. not be discernible and its genesis is attributed to retrogression that has led to its formation at a temperature and pressure range of 550–625° C and 3–4 kb respectively, being the maximum in the facies transitional to granulites[5]; and the porphyroblastic growth by metamorphic differentiation.

The author expresses his gratefulness to Dr. B. Dash, ex-Reader in Geology, for suggesting the topic and helping at different stages of the work. The guidance and timely suggestions of Sri. A. K. Paul, Lecturer, during field work and in preparing this paper are gratefully acknowledged. Thanks are due to Sri. K. N. Sahu and Sri. K. L. Pandya, Lecturers, for their co-operation during laboratory

work. Finally, the author owes his gratefulness to Dr. S. Acharya, Professor and Head of the Department. for providing laboratory facilities.

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GROWTH OF BARLEY AND WHEAT ENDOSPERM IN CULTURES

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ENDOSPERM plays a very significant role in the nutrition and differentiation of embryo. In angiosperms it develops as a result of triple fusion and is mostly triploid. The tissue derived from the culture of endosperm is a homogeneous mass of parenchymatous cells and, therefore, offers a very suitable system for studies on growth and differentiation.

In recent years several attempts have been made to culture immature and mature endosperm, but success has been very limited. So far it has been possible to culture and induce differentiation in the endosperm of some dicotyledonous plants belonging to Euphorbiaceae, Loranthaceae and Santalaceae (*see* Johri[1]; Sehgal[2]).

In 1947, LaRue[3] succeeded in establishing cultures of maize endosperm. Since then several workers (Sehgal[4]; Straus[5]; Straus and LaRue[6]; Tamaoki and Ullstrup[7]) made futile attempts to get differentiation and organogenesis in maize endosperm callus. Norstog[8] established continuous cultures from the endosperm of English rye grass. However, he also could not get differentiation from the callus (*see also* Norstog *et al.*[9]). Trione *et al.*[10] failed to grow the endosperm of wheat. The present work was undertaken to study the morphogenetic potentialities of endosperm in two monocotyledonous plants; barley (*Hordeum vulgare* L.) and wheat (*Triticum aestivum* L.).

Ovaries of *Hordeum* and *Triticum* collected 8 days after pollination were surface-sterilized with chlorine water for 7–10 minutes, followed by rinsing in sterile distilled water. The chalazal part of the endosperm was scooped out and planted under aseptic conditions on modified White's basal medium containing 4% sucrose jelled with 0·8% Difco Bacto-agar (WM). The medium was also supplemented with various concentrations of adenine (Ad — 20, 40 ppm); autoclaved, coconut milk (CM — 10, 20%); casein hydrolysate (CH — 0·1, 0·25%); indole acetic acid (IAA — 1, 5 ppm); kinetin (Kn — 0·5, 1 ppm); yeast extract (YE — 0·1, 0·25%); zeatin (Ze — 0·5, 1 ppm) and 2,4-dichlorophenoxy acetic acid (2,4-D—1, 5 ppm) either singly or in various combinations. The pH of the medium was adjusted to 5·8 before autoclaving. For each treatment 48 cultures were maintained in diffuse daylight at 25 ± 1° C and 55 ± 5% relative humidity.

In the preliminary experiments endosperms were cultured 4, 6 and 8 days after pollination. The ones excised after 4 and 6 days failed to respond to any of the treatments. Therefore, in subsequent experiments only the endosperms collected from grains 8 days after pollination were inoculated.

In *Hordeum* the endosperm failed to grow on WM or WM supplemented with various concentrations of the above growth regulators, either singly