Effect of IAA on growth, organogenesis and RNA metabolism during the development of *Cichorium intybus* root explants cultured „in vitro”

E. GWÓZDŹ

Department of General Botany, Institute of Biology, Adam Mickiewicz University

(Received: March 29, 1973)

Abstract

The effects of 3-indolylacetic acid (IAA) on growth, organogenesis, RNA content, RNase activity and MAK elution profiles during the development of chicory root explants cultured *in vitro* were investigated. It was found that the intensive callus growth in the presence of IAA was accompanied by an increase in the RNA content, with simultaneous decrease of RNase activity. Fractionation of RNA by MAK column chromatography showed that the high content of RNA in the callus under the influence of IAA was due to an increased accumulation of the ribosomal fraction of RNA mainly. Experiments with actinomycin D demonstrated that this antibiotic abolished both the auxin-induced callus growth and the inhibitory effect of IAA on bud formation. No significant inhibition of spontaneous bud formation under the influence of actinomycin D was observed. The possible relationship between the IAA-affected morphogenetic processes and RNA metabolism is discussed.

INTRODUCTION

Cuttings of chicory root present a material with high regenerating potency which may be easily controlled by exogenously applied auxin (Gautheret 1959; Gwóźdź and Szweykowska 1967). In dependence on the concentration used, IAA stimulates or inhibits the regeneration of shoots, roots or callus. With increasing concentrations of IAA, the development of callus gradually dominates over organogenesis. In a previous study (Gwóźdź and Szweykowska 1969) it has been found that the strong expansion growth of callus was accompanied by an increased level of protein content and that the shifting of the morphogenetic balance under the influence of IAA was reflected in the distribution of protein content between various forms of growth.

There are many reports indicating that the auxin-induced cell elongation is accompanied by quantitative as well as qualitative changes in RNA synthesis (reviewed by Trewavas 1968; Key 1969). Changes in RNase activity under the influence of auxin have also been described (Truelsen 1967; Pilet and Braun 1967; Pilet 1970).

The purpose of this study was to investigate the relationship between auxin-induced morphogenetic processes and content of RNA, its MAK elution profiles, RNase activity and the response to actinomycin D in explants of chicory roots cultured in vitro.

MATERIAL AND METHODS

Roots of *Cichorium intybus* L. var. *sativum*, cv. Polanowicka were used in the experiments.

After surface sterilization in 0.2 per cent HgCl_2 , the roots were washed several times with sterile water and then cut into discs 1 cm thick from which cylinders were cut out (0.7 cm in diameter and about 0.5 g weight) containing fragments of cambium, xylem and phloem. The explants were placed with their apical ends in the medium. Heller's (1953) mineral solution was used as basal medium, modified by increasing the level of NaNO_3 to 1200 mg/l and of NaH_2PO_4 to 200 mg/l (Gwóźdź and Szwejkowska 1969a). The medium was solidified with 0.8 per cent agar, and supplied with 1.5 per cent sucrose. In experimental variants, 3-indolylacetic acid (IAA) and actinomycin D (AD) were included in the medium. The cultures were kept under a continuous, white fluorescent light (600 lux) and at a temperature of about 24°C. After a given time of culture the fresh weight of callus was estimated. All estimations (including fresh weight, total amount of RNA and RNase activity) and extraction of RNA for column chromatography were limited to the callus without roots and shoots which had been previously removed. Callus was cut into small pieces and, depending on the kind of experiment, quickly frozen in dry ice or sealed in 80 per cent ethanol.

Determination of RNA. The total amount of RNA was determined by the method of Ogur-Rosen modified by Ingle (1968). One-gram samples of the fresh weight of tissue stored in ethanol were gently homogenized in a precooled mortar with 80 per cent ethanol, centrifuged, the pellets were washed briefly with cold 5 per cent (w/v) perchloric acid and defatted by two treatments with ethanol-ether-chloroform mixture (2:1:1 by vol). The colourless residue was dissolved in 0.3 N KOH and the RNA hydrolyzed for 18 hr at 37°C. The solution was neutralized and then acidified with 60 per cent perchloric acid to 0.2 N, kept at 0°C for 30 min. and centrifuged to remove the DNA and protein. Aliquots of the supernatant were diluted with water to a known

volume and used to determine the RNA content by measurement of O.D. at 260 nm and comparison with the standard curve for high molecular weight yeast RNA.

RNase activity. The activity of RNase was determined by the method described by Tuve and Anfinson (1969) modified by Schneider (unpublished data). Frozen plant material was ground in a mortar with the addition of quartz sand and of 0.05 M Tris-HCl, pH 7.5, containing 0.01 M NaCl. After centrifugation for 10 min. at 3000 g, 0.5-ml samples were incubated for 0.5 hr at 37°C in the presence of 2 ml of 0.1 M acetate buffer pH 5.0, and 0.5 ml of substrate (yeast RNA 10 mg/ml of 0.1 M acetate buffer). The reaction was stopped by the addition of 1 ml Mc Fadyens' reagent (0.25 per cent uranyl acetate in 2.5 per cent TCA). Precipitated proteins and hydrolysis-resistant nucleic acids were removed by centrifugation for 10 min. at 20,000 g at 0°C. A sample of 0.5 ml was taken from the supernatant, 3 ml of H₂O was added and extinction at 260 nm (E_{260}) was measured. From this value, E_{260} for the zero time sample was subtracted. The enzyme activity was expressed as E_{260} units in relation to 1 g of fresh weight of tissue.

Extraction and fractionation of nucleic acids. The nucleic acids were prepared according to the procedure described by Kirby (1965) with some modifications. The frozen tissue was powdered in a coffee-mill and the dry powder thoroughly ground in a mortar with acid-washed sand with the addition of 15 ml of extraction medium containing 0.005 M Tris-HCl buffer, pH 7.5, and 1 per cent sodium lauryl sulphate (SLS), 2 ml of bentonite suspension in water (25 mg/ml) prepared after Watts and Mathias (1969) and 17 ml phenol-cresol mixture (phenol, 500 g; m-cresol, 70 ml; water, 50 ml) with 0.1 per cent 8-hydroxyquinoline. The slurry was subsequently homogenized in a blender-type homogenizer (Typ 302, UNIPAN, Poland) for 5 min. in ice bath. The phases were separated by centrifugation (1500 g for 10 min.) and the upper, aqueous layer was carefully pipetted. The remaining phenolic phase with the material at the interphase was reextracted once more with 20 ml of 0.005 M Tris-HCl buffer, pH 8.0, and 0.5 per cent SLS. After centrifugation, the aqueous phases were combined, treated with half of their volume of fresh phenol-cresol mixture, vigorously stirred for 10 min. and centrifuged. This step was repeated several times until no denatured protein was visible at the interphase after centrifugation. For better deproteinization, the chloroform-isoamyl alcohol (10:1) mixture was also used. Nucleic acids were precipitated from the buffer with 2.5 vol. of 96 per cent ethanol, centrifuged, dialyzed overnight, reprecipitated with ethanol, and dissolved in 0.3 M NaCl. The insoluble material was removed by centrifugation (20,000 g for 15 min. at 2°C).

Samples containing 1 mg of the nucleic acid preparation were placed on columns of methylated albumin coated kieselguhr (MAK) prepared

according to Mandell and Hershey (1960), and eluted with a linear gradient of NaCl from 0.3 M to 1.2 M in 0.025 M Tris-HCl, pH 7.2. Samples of 3.5 ml were collected and determined spectrophotometrically at 260 nm.

RESULTS

Growth and organogenesis. Two concentrations of IAA, 10 and 100 mg/l were used in the experiments. A culture on nutrient medium without IAA served as control. The growth and organogenesis of *Cichorium* root explants were similar to those found in the previous investigation (Gwózdź and Szweykowska 1967). In the first week of culture the volume and fresh weight of explants increased and callus was formed on their upper (morphologically basal) ends (Fig. 1). In the presence of auxin callus was much larger than in control and consisted of a rather soft, loose and translucent tissue. Buds formed in the callus of control explants after the first week of culture. In the presence of

Fig. 1. Effect of IAA on regeneration and organogenesis of chicory root explants.

10 mg/l IAA roots appeared at about the same time. IAA (10 mg/l) delayed bud formation which occurred in the third week of culture but not in all explants (Fig. 1). At the highest concentration of IAA (100 mg/l) formation of both buds and roots was completely inhibited. It seems that the inhibitory effect of IAA on organogenesis results from the competition between the strong growth of callus and organ formation. The growth rate of callus, in the control as well as in the presence of IAA, was highest in the first week of culture. After this time the growth slowed down in the control, but in the presence of IAA maintained a relatively high rate (Fig. 2a). It should be noted that after 3 days of culture the rate of callus growth in the presence of IAA 100 mg/l was near that of the control. This might be explained by the occurrence of what is known as lag period which has been described for many tissues (Nelson et al. 1969, Maheshwari and Nooden 1971).

Fig. 2. Effect of IAA on fresh weight (a), RNA content (b) and RNase activity (c) of the callus.

Content of RNA and RNase activity. The stimulatory effect of IAA on callus growth was caused not only by the increase of the fresh weight of tissue but also by a higher RNA content with

a simultaneous decrease of RNase activity. After 3 days of culture, an increase of RNA content was observed in the control and both concentrations of IAA; it was highest where IAA 10 mg/l was used (Fig. 2b). After a week the content of RNA reached its maximum which in the control might be connected with the differentiation of buds and in the presence of auxin with a strong growth of callus (Fig. 2a and b). The activity of RNase was distinctly decreased by the presence of IAA, showing generally some correlation with the RNA content of the callus (Fig. 2c). After 10 days, the RNA content remained at a high level in the presence of auxin, whereas in the control it considerably declined. Taking into account the simultaneous increase in RNase activity in the control, one may consider that after bud formation the rate of RNA synthesis in the callus decreased and its degradation increased. This interpretation seems to be supported by the increasing enzyme activity also after 2 weeks of culture, while in the presence of IAA the activity of RNase remained relatively low. A strong decrease of the RNA content in the presence of 100 mg/l IAA after 15 days might be related to an enhanced ageing of the tissue at this concentration.

MAK column chromatography. The results presented above indicate an influence of IAA on the RNA content. By RNA fractionation on MAK column an attempt was made to obtain some information on the effect of IAA on various RNA fractions. The experiments were restricted to the initial period of most intensive callus growth (after 3 and 6 days of culture). RNA was separated into three main fractions which were identified according to Chroboczek and Cherry (1966) as sRNA, DNA-RNA and rRNA (Fig. 3a). The separations were repeated several times with similar results. It was found that in IAA-treated callus the relative amount of rRNA was particularly increased, and the increase could be observed as early as after 3 days of culture (Tab. 1). After 6 days of culture in the presence of IAA, a further relative increase in rRNA was observed (Tab. 1). The very high ratio of rRNA to sRNA in the case of 100 mg/l of IAA is due to both the increase of rRNA and the decrease of sRNA (Fig. 3). These results seem to indicate that the high level of callus growth and of RNA content in the presence of IAA is related first of all to an increased accumulation of the rRNA fraction.

Effect of actinomycin D. In order to obtain additional information to what extent the growth of callus and organogenesis as well as the participation of auxin in these processes are related to DNA-dependent RNA synthesis, two sets of experiments were carried out with actinomycin D (AD), the widely known inhibitor of this synthesis not only in bacterial systems but also in a variety of plant tissues (Nooden and Thimann 1966; Key 1969). To examine the effect of AD on spontaneous organogenesis of the chicory root explants, two

Table 1

Effect of IAA on the ratio of total O.D. of rRNA to total O.D. of sRNA after 3 and 6 days of culture

Concentration of IAA mg/l	O.D. rRNA/O.D. sRNA	
	Days of culture	
	3	6
0	2.0	4.0
10	4.3	5.0
100	7.0	10.0

Fig. 3. MAK fractionation of purified RNA extracted from 6-day-old callus.

Table 2

Effect of actinomycin D on the IAA-induced callus growth after 5 weeks of culture

IAA mg/l	0	10	10	10
Actinomycin D mg/l	0	0	20	50
Fresh weight g/callus	1.100	2.130	1.000	0.850

concentrations of AD, 20 and 50 mg/l, were used. A culture on medium without AD served as control. As far as the effect of AD on IAA-induced morphogenetic processes is concerned, the same concentrations of the antibiotic were used with a constant, 10 mg/ level of IAA in the medium, and a culture on medium with IAA, but without AD serving as control.

In the first set of experiments, the control explants and those in the presence of both concentrations of inhibitor showed similar growth and development during the first two weeks of culture. Thus AD neither delayed nor inhibited bud formation. However, at a later time of culture some significant differences in the development of explants occurred. For instance, after five weeks of culture in the control medium explants developed shoots with long, light green leaves, while in the presence of AD leaves were shorter, dark green and deformed (Fig. 4).

Figure 4. Five week old explants grown on various concentrations of actinomycin D.

Figure 5. Three week old explants grown on media with 10 mg/l of IAA and various concentrations of actinomycin D.

In the second set of experiments, in which besides 20 or 50 mg/l AD the medium also contained 10 mg/l IAA, the development of explants showed significant differences from the beginning of the culture. In the presence of IAA alone abundant callus was formed, while in the presence of both IAA and AD, especially at 50 mg/l AD, callus was only poorly developed, similarly as in the absence of auxin (Fig. 5). In both AD concentrations roots were formed, indicating that the inhibitor did not affect the auxin-induced rhizogenesis. However, roots formed in the presence of AD were thicker and shorter than those in the control (Fig. 5). It is rather surprising that in the presence of IAA alone no shoots developed, whereas small shoots were formed in many explants at 20 and even 50 mg/l AD concentrations (Fig. 5). This seems to confirm the assumption that the inhibitory effect of IAA on bud formation might be based on the competition connected with the strong domination of callus growth. Results presented in table 2 show that AD caused a decrease in the fresh weight of callus which amounted to one half of that in the presence of IAA alone. Moreover, in the presence of 10 mg/l IAA and 50 mg/l AD (pooled together), the fresh weight of callus was even lower than on the basal medium, devoid of both IAA and AD.

DISCUSSION

The organogenetic processes in chicory root callus seem to be correlated with some changes in nucleic acid metabolism, as shown for instance by a high increase in RNA content and RNase activity prior to bud formation, after about 3—7 days of culture on control medium.

Similarly Thorpe and Murashige (1970) found histochemically that an increase in RNA and protein content preceded bud formation in tobacco callus culture. Shortly after bud appearance, the intensity of callus growth and its RNA content decreased, while the activity of RNase continued to increase. It seems that this might be due to a progressive translocation of RNA precursors (e.g. nucleotides) and RNA synthesis from callus to shoots. Such an interpretation may be supported by the results obtained in a previous study concerning the distribution of protein nitrogen between various forms of growth in regenerating explants of chicory root (Gwóźdz and Szweykowska 1969).

Another problem is, whether spontaneous kaulogenesis is related to a switching to the synthesis of some specific RNA. Results obtained by means of AD threw some light on this problem. This inhibitor even at highest concentration used (50 mg/l) did not inhibit bud formation, only disturbed their further development. This seems to suggest that the differentiation of buds may be related to the presence of some pool of "long lived" cytoplasmic RNA. Similarly, Dure and Waters (1965) found no change in the rate of protein synthesis as well as in the ratio of monoribosomes to polyribosomes under the influence of AD during the first 36 hr of cotton seed germination. It was also reported that AD inhibited neither cell division in the onion root tip during 40 hrs of action (Ball and Gross 1963) nor the germination of lettuce seeds in a concentration as high as 500 mg/l (Neumann 1964).

The significant correlation between the auxin-induced rate of callus growth, RNA content and RNase activity found in this study is in agreement with the commonly accepted view that an increased synthesis of RNA is essential for auxin-induced growth (Key 1969), and with some data indicating that auxin may be involved in the RNA metabolism by affecting also the activity of RNase. Truelsen (1967) found that in the presence of IAA the RNase activity decreased with a simultaneous increase in the elongation rate of wheat coleoptile sections and that the enzyme activity was paralleled by opposite changes in RNA net synthesis. Also Pilet (1970) reported that, under the influence of IAA, RNase activity decreased, and, consequently, the RNA level was raised in lentil root sections. These results together with the data presented in this paper seem to suggest that auxin may be a factor controlling the metabolism of RNA by increasing its synthesis as well as by reducing its degradation.

MAK chromatography experiments demonstrated that the promotion by auxin of callus growth was connected not only with a generally increased RNA content, but also with some selective stimulation of the ribosomal RNA fraction. This is in agreement with the results of other experiments with the use of MAK chromatography (Ingle and Key

1965) or differential centrifugation (Key and Shannon 1964), which showed that auxin caused an increased incorporation of precursors into ribosomal RNA or ribosomes, respectively. Cherry (1967) showed that nuclei isolated from soybean hypocotyl tissue and treated in vitro with 2,4-D possessed a higher ability of synthesis of ribosomal RNA than of other nucleic acid fractions. This result may indicate that auxin affects the synthesis of RNA directly through the nucleus.

The inhibitory effect of IAA on shoot formation may be of a competitive nature, resulting from a strong stimulation of callus growth. It is possible that exogenously applied auxin disturbs both the hormonal and anatomical balance in the explant, which are necessary for bud formation. Exogenously applied auxin may also affect nucleic acid metabolism in callus. The development of callus and bud formation may have different requirements concerning the quantity as well as quality of nucleic acids and proteins. Thus, growth-promoting concentrations of IAA might affect e.g. the DNA/RNA ratio which in Skoog's view (1954) influences the relation between cell enlargement, cell division and organ formation. The suppression by AD of IAA-induced promotion of callus growth with a simultaneous restoration of kaulogenesis seems to confirm this suggestion.

The stimulation of rhizogenesis by IAA is a well known phenomenon. Many reports support the idea that this auxin action involves the induction of specific m-RNA synthesis (Guillot 1966; Fellenberg 1966; Ruge 1969; Libbert 1967). Recently, Jalouzot (1971) found that quantitative as well as qualitative changes of RNA took place as early as 6 hrs after isolation of pea stem fragments which later formed roots. Since all estimations carried out in this study were made as late as after 3 days from the beginning of the experiments, the results obtained may not be quite conclusive. It is, however, interesting that AD, which abolished the auxin-induced increase in callus growth, showed no significant inhibition of rhizogenesis, limiting only growth of the roots produced. These results are in agreement with those obtained by Mitsuhashi et al. (1969) who not only did not find inhibition of root formation by AD but even observed some stimulation in stem segments of pea. This seems to indicate that, at least in some cases, auxin-induced rhizogenesis may be controlled by certain forms of actinomycin-resistant RNA. It has also been attempted to explain in this way the lack of inhibition by AD of mitotic activity in the onion root tip (Ball and Gross 1963) as well as of the intensity of respiration in potato tuber discs (Click and Hackett 1963).

This work was partly supported by the Polish Academy of Sciences within the project 09.3.1.

Acknowledgements

I thank Professor A. Szweykowska for many helpful discussions and for critical reading of the manuscript. I am also grateful to Dr. J. Schneider for help in the estimation of RNase activity, to Dr. Z. Schneider for supplying methylated albumin and to Merck Sharp & Dohme, Rahway, U.S.A., for the gift of actinomycin D.

REFERENCES

- Ball A. and Gross P. R., 1963. Mitosis and differentiation in roots treated with actinomycin, *Science* 139: 584—586.
- Cherry J. H., 1967. Nucleic acid biosynthesis in seed germination: Influences of auxin and growth-regulating substances, *Ann. N. Y. Acad. Sci.* 144: 154—68.
- Chroboczek H., and Cherry J. H., 1966. Characterization of nucleic acids in peanut cotyledons, *J. Mol. Biol.* 19: 28—37.
- Click R. C. and Hackett D. P., 1963. The role of protein and nucleic acid synthesis in the development of respiration in potato tuber slices, *Proc. Natl. Acad. Sci. U. S.* 50: 243—250.
- Dure L. and Waters L., 1965. Long-lived messenger RNA: evidence from cotton seed germination, *Science*, N. Y. 147: 410—412.
- Fellenberg G., 1966. Die Hemmung auxininduzierter Wurzelbildung an etiolierten Erbsenepikotylen mit Histon und Antimetaboliten der RNS- und Proteinsynthese, *Planta* 71: 27—42.
- Gautheret R. J., 1959. La culture des tissus végétaux, Masson, Paris.
- Guillot A., 1966. Relations entre la rhizogenèse et variations de la teneur des tissus en acides nucléiques dans les boutures de jeunes plantes étiolées de tomate, *C. R. Acad. Sci. (Paris), Sér. D* 263: 358—361.
- Gwóźdź E. and Szweykowska A., 1967. The effect of kinetin and IAA on the organogenesis in root explants of *Cichorium intybus*, *Bull. Soc. Amis Sci. Lettr. Poznań D-8*: 3—9.
- Gwóźdź E. and Szweykowska A., 1969a. The effect of some nutritional factors on the organogenesis in root explants of *Cichorium intybus*, *Bull. Sci. Amis Sci. Lettr. Poznań D-9*: 11—18.
- Gwóźdź E. and Szweykowska A., 1969b. The effect of IAA on growth, organogenesis and protein synthesis in explants of *Cichorium roots*, *Bull. Soc. Amis Sci Lettr. Poznań D-10*: 3—9.
- Heller R., 1953. Recherches sur la nutrition minérale des tissus végétaux cultivés in vitro, *Ann. Sci. Natur. Bot.* 14: 1—223.
- Ingle J. and Key J. L., 1965. A comparative evaluation of the synthesis of DNA-like RNA in excised and intact plant tissues, *Plant Physiol.* 40: 1212.
- Ingle J., 1968. The effect of light and inhibitors on chloroplast and cytoplasmic RNA synthesis, *Plant Physiol* 43: 1850—1854.
- Jalouzet R., 1971. Étude du métabolisme des acides nucléiques et des protéins au cours de l'initiation de racines adventives, *Planta* 97: 16-27.
- Key J. L. and Shannon J. C., 1964. Enhancement by auxin of RNA synthesis in excised soybean hypocotyl tissue, *Plant Physiol.* 39: 360-364.
- Key J. L., 1969. Hormones and nucleic acid metabolism, *Ann. Rev. Plant Physiol.* 20: 440-474.
- Kirby K. S., 1965. Isolation and characterization of ribosomal ribonucleic acid, *Biochem. J.* 96: 266—269.

- Libbert E., 1967. Extraktion einer RNS — Fraktion, die nach Auxinbehandlung entsteht und Wurzelbildung induziert, Wiss. Z. Univ. Rostock 16: 475—476.
- Maheshwari M. G. and Nooden L. D., 1971. A requirement for DNA synthesis during auxin induction of cell enlargement in tobacco pith tissue, Physiol. Plant. 24: 282—287.
- Mandell J. D. and Hershey A. D., 1960. A fractionating column for analysis of nucleic acids, Anal. Biochem. 1: 66—77.
- Mitsuhashi M., Shibaoka H. and Shimokoriyama M., 1969. Morphological and physiological characterization of IAA-less-sensitive and IAA-sensitive phases in rooting of Azukia cuttings, Plant Cell Physiol. 10: 867—874.
- Nelson H., Ilan I. and Reinhold L., 1969. The effect of inhibitors of protein and RNA synthesis on auxin-induced growth, Israel J. Bot. 18: 129—134.
- Neumann J., 1964. The effect of actinomycin D on lettuce seedlings and its differential uptake by roots and shoots, Physiol. Plant 17: 363—370.
- Nooden L. D. and Thiman K. V., 1966. Action of inhibitors of RNA and protein synthesis on cell enlargement, Plant Physiol. 41: 157—164.
- Pilet P. E. and Braun R., 1967. The interrelation of RNA, auxin and auxin-oxidases in lentil roots, Physiol. Plant. 20, 870—878.
- Pilet P. E., 1970. The effect of auxin and abscisic acid on the catabolism of RNA, J. Exp. Bot. 21: 446—451.
- Ruge U., 1969. Beeinflussung der Adventivwurzelbildung durch Stoffwechselgifte I, Z. Pflanzenphysiol. 61: 430—446.
- Skoog F., 1954. Substances involved in normal growth and differentiation of plants, Brockhaven Symp. in Biol. 6 (BNL/258): 1—21.
- Thorpe T. A. and Murashige T., 1970. Some histochemical changes underlying shoot initiation in tobacco callus cultures, Can. J. Bot. 48: 227—285.
- Treavas A., 1968. Relationship between plant growth and nucleic acid metabolism. (In:) Progress in phytochemistry (L. Reinhold and Y. Liwischitz, eds.) vol. 1: p. 113—160, London — New York — Sydney.
- Truelsen T. A., 1967. Indoleacetic acid — induced decrease of the ribonuclease activity in vitro, Physiol. Plant. 20, 1112—1119.
- Tuve T. W. and Anfinson O. D., 1969. Preparation and properties of spinach ribonuclease, J. Biol. Chem. 235: 3437—3441.
- Watts R. L. and Mathias A. P., 1969. The use of bentonite in the isolation of plant polyribosomes, Bioch. Bioph. Acta 145: 828—831.

Author's address:
Dr. Edward Gwóźdź
Institute of Biology,
Adam Mickiewicz University
Stalingradzka 14
61-713 Poznań, Poland

*Wpływ IAA na wzrost, organogenezę i metabolizm RNA
w trakcie rozwoju eksplantatów korzenia cykorii hodowanych „in vitro”*

Streszczenie

Zbadano wpływ kwasu 3-indoliloctowego na wzrost, organogenezę, zawartość RNA, aktywność RNazy i profile elucyjne RNA rozdzielonego na kolumnie MAK w trakcie rozwoju eksplantatów korzenia cykorii hodowanych „in vitro”. Stwier-

dzono, że intensywnemu wzrostowi kalusa w obecności IAA towarzyszy wzrost zawartości RNA przy równoczesnym obniżeniu aktywności RNazy. Rozdziały RNA na kolumnie MAK wykazały, że wysoka zawartość RNA w kalusie w obecności IAA spowodowana była zwiększeniem zawartości głównie frakcji rybosomalnego RNA. Doświadczenia z użyciem aktynomycyny D wykazały, że znosi ona zarówno stymulujący wpływ IAA na wzrost kalusa, jak również hamujący wpływ IAA na tworzenie się pączków. Nie stwierdzono wyraźnie hamującego wpływu aktynomycyny D na spontaniczną kaulogenezę. W pracy dyskutowana jest możliwość istnienia wzajemnej zależności między udziałem IAA w procesach morfogenetycznych a metabolizmem RNA.

*Zakład Botaniki Ogólnej
Instytutu Biologii UAM
Poznań, ul. Stalingradzka 14.*