EFFECT OF STIK ON ROOTING AND REGENERATION OF STEM CUTTINGS OF *AERVA SANGUINOLENTA* LINN

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ABSTRACT

The lower concentrations of Stik (100 and 500 ppm) hastened sprouting and subsequent shoot growth of the cuttings, while the higher concentration (2000 ppm) favoured better root formation. The concentrations promoting rooting showed reduced sprouting. Treated inverted cuttings showed lower percentage of rooting whereas the untreated ones did not root at all.

INTRODUCTION

THE morphogenetic phenomenon of root initiation and regeneration of the stem cuttings of various plant species are differently affected by various growth regulators, inhibitors and some salts of sodium and potassium[1-3]. Stik is a new plant growth regulator which bears the active ingredient naphthalene acetic acid with sodium salt. NAA has been used for rooting of stem cuttings of many plant species[1, 4, 5] and has been shown to be more effective than other auxins (IAA) owing to its powerful activity and slow destruction in contrast to IAA which is readily oxidised[6]. The present experiment was carried out to investigate the potential of Stik with respect to rooting and regeneration capacity of the stem cuttings of *Aerva sanguinolenta*.

MATERIALS AND METHODS

Aerva sanguinolenta is a rambling perennial herb commonly cultivated as a hedge plant. Stem cuttings (15 cm) collected from the 8-month-old plants were grouped into batches of 50 each. The basal ends of the cuttings were dipped in aqueous solutions of different concentrations of Stik (*i.e.* 100, 500, 1000 and 2000 ppm), separately, to a depth of 5 cm for 48 hr at room temperature (22 ± 1°C). Distilled water-treated sets served as the control. All the cuttings were then planted upright in soil pots (18 cm diameter) containing garden soil and kept under the laboratory conditions (18°–26.5°C).

With a view to studying the effect of polarity on regeneration, two groups of the cuttings were inverted and their apical (morphological) ends were treated with Stik (500 ppm) and distilled water (control) for the same period (48 hr). After treatment they were planted with their apical ends in the soil.

After 30 days, the cuttings were carefully removed from the pots with their roots intact, and the data on the growth of roots and shoots were recorded (figures 1, 2; table 1).

RESULTS

Upright cuttings

As the concentration of Stik increased, the rooting percentage increased, while sprouting frequency declined in comparison to control set (figures 1, and 3 A–E). The root number per cutting also increases as the concentration of the Stik increases (figure 2). The maximum number of roots formed was recorded at 2,000 ppm, although the increment in the length of the root did not follow the same trend (figure 2). Stik of 100 ppm was recorded to show highest rooting (92%, figure 1).

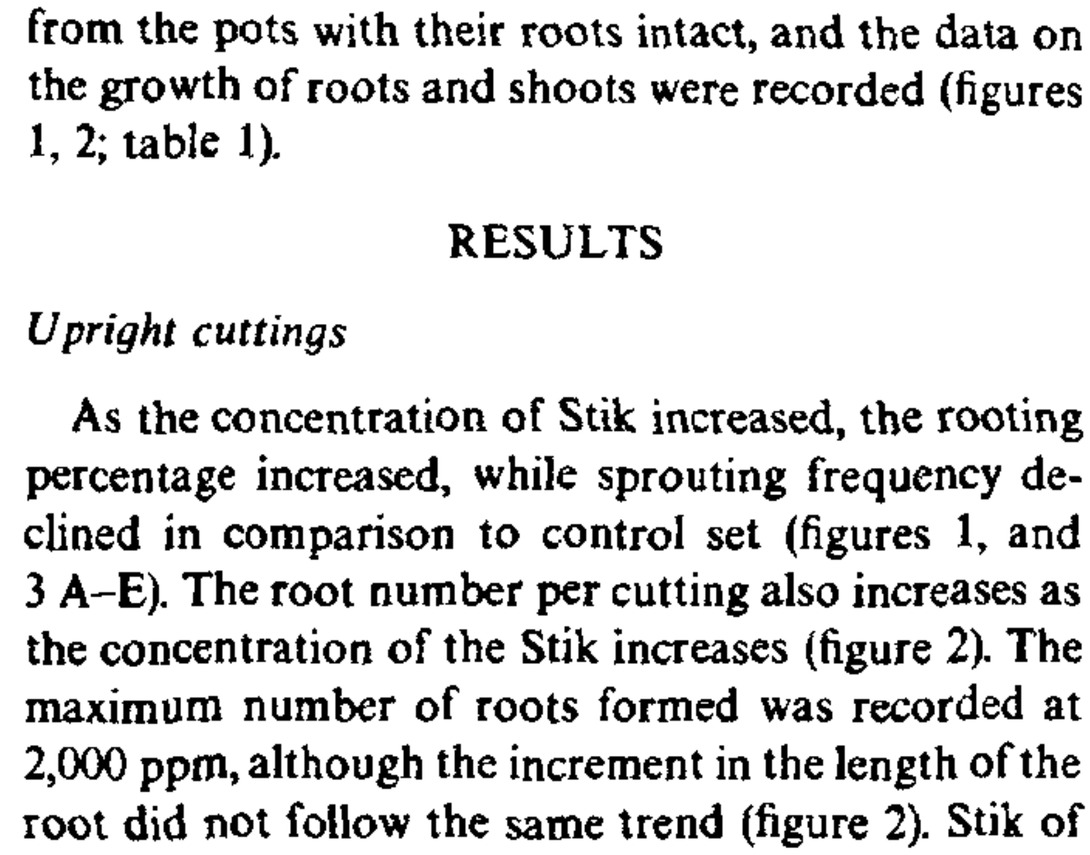

Figure 1. Rooting and sprouting percentage of *Aerva sanguinolenta* cuttings treated with different concentrations of Stik (Concentration C = Control, $S_1 = 100$, $S_2 = 500$, $S_3 = 1000$ and $S_4 = 2000$ ppm of Stik for UPRIGHT Cuttings. C_1 = Control and $S_5 = 500$ ppm of Stik for INVERTED Cuttings.

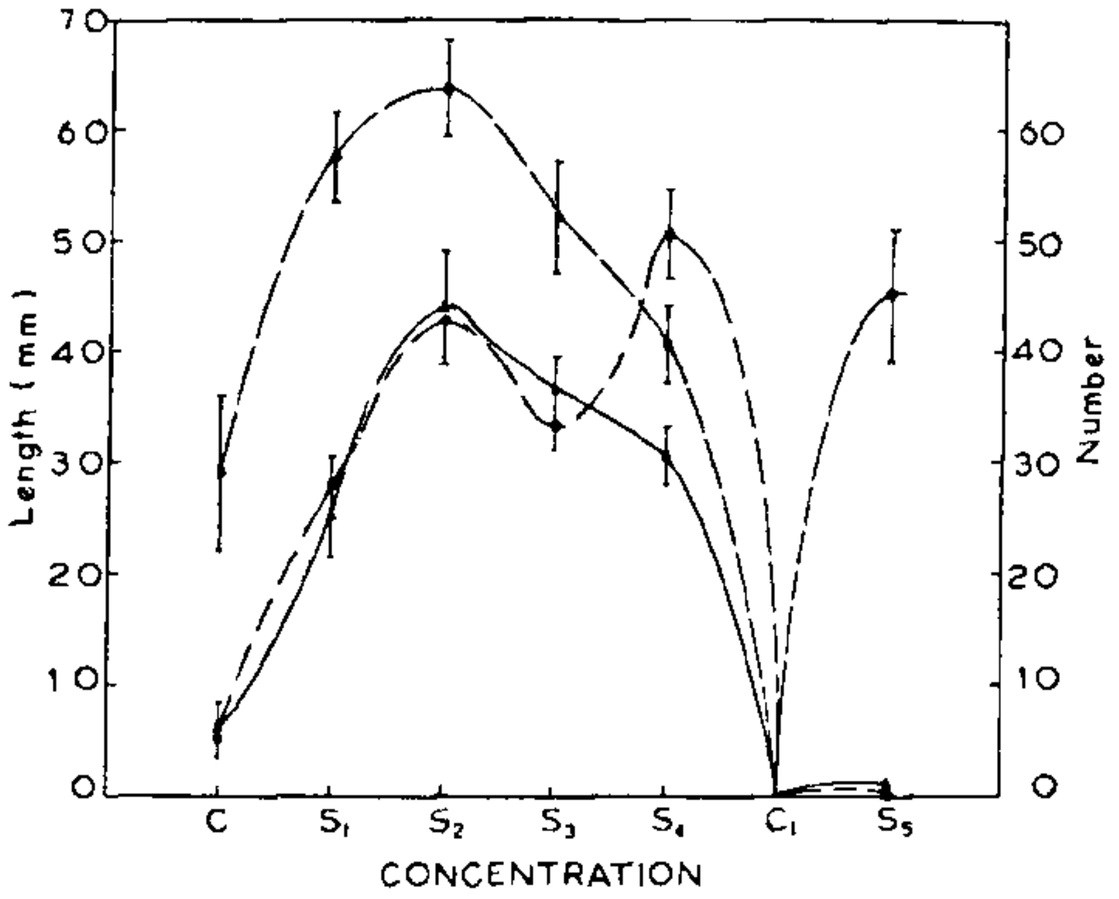

Figure 2. *Aerva sanguinolenta.* Average length of root per cutting o—o, Average number of roots formed per cutting ●—● and Δ—Δ show length of region on cuttings where rooting occurred. Vertical bars indicate the SE of means.

The number of lateral branches and number of leaves formed per cutting decreased as the concentration of the Stik increased (table 1). In general, the lower concentrations (*i.e.* 100 and 500 ppm) of Stik showed higher root and shoot growth in comparison to the higher concentrations. The colour of the leaves also varied for different concentrations. Stik of 500 ppm was recorded to show more greenish purple colour.

As the concentrations increase the fresh weight of the shoot per cutting decreases and the corresponding value for roots increases. The highest fresh weight for the roots per cutting was recorded (57.8 mg) under the influence of 2,000 ppm of Stik which also resulted in the formation of the highest number of roots per cutting (table 1, figure 2).

Inverted Cuttings

Inversion of cuttings did not suppress regeneration in *A. sanguinolenta.* Roots emerged only from the nodes in the inverted cuttings treated with Stik 500 ppm (figure 3 A–F). There was no rooting in the cuttings treated with distilled water. In inverted cuttings treated with Stik, the top of the exposed morphological base showed initiation of rooting (about 100 root initials, length 0.8 to 1 mm). As far as sprouting and shoot growth are concerned the control set showed superiority over treated ones.

DISCUSSION

Higher concentration (2000 ppm) of Stik resulted in the maximum number of roots produced per cutting which supported the findings of Kalmar[7] who reported that treatment with higher concentration of NAA (3000 ppm) induced the maximum rooting in the cuttings of *Picea abies.* Kinary[8] also observed that NAA alone or as a mixture with IAA resulted in better rooting and shoot growth in the cuttings of *Populus alba* and *P. tremula.* Different concentrations of Stik favour root formation since in this both NAA and Na^+ mutually function for root initiation in the cuttings of *A. sanguinolenta* similar to the reports of Middleton *et*

Table 1 *Effect of Stik on sprouting of buds and their subsequent growth in the stem cuttings of Aerva sanguinolenta Linn.*

Growth parameters	Treatment (ppm)-Upright Cuttings					Inverted Cuttings	
	Control	Stik 100	Stik 500	Stik 1000	Stik 2000	Control	Stik 500
Number of lateral branches per cutting	2.16±0.366	2.00±0.316	1.67±0.308	1.32±0.316	0.32±0.104	1.0±0.0	1.17±0 673
Number of leaves formed per cutting	9.83±2.073	8.20±1.587	7.00±1.474	2.89±1.298	0.50±0.255	1.15±0.97	1.61±0.879
Average length of the largest lateral branch (mm)	34.5±5.231	35.18±6.452	32.67±6.513	22.06±1.403	1.70±0.615	8.13±3.131	6.67±3.215
Fresh weight of root per cutting (mg)	2.66	30	62.5	75	157.8	0.00	1.54
Fresh weight of shoot per cutting (mg)	118.33	161.11	197.14	66 67	6.68	16.79	10 21

± indicates the SE of means.

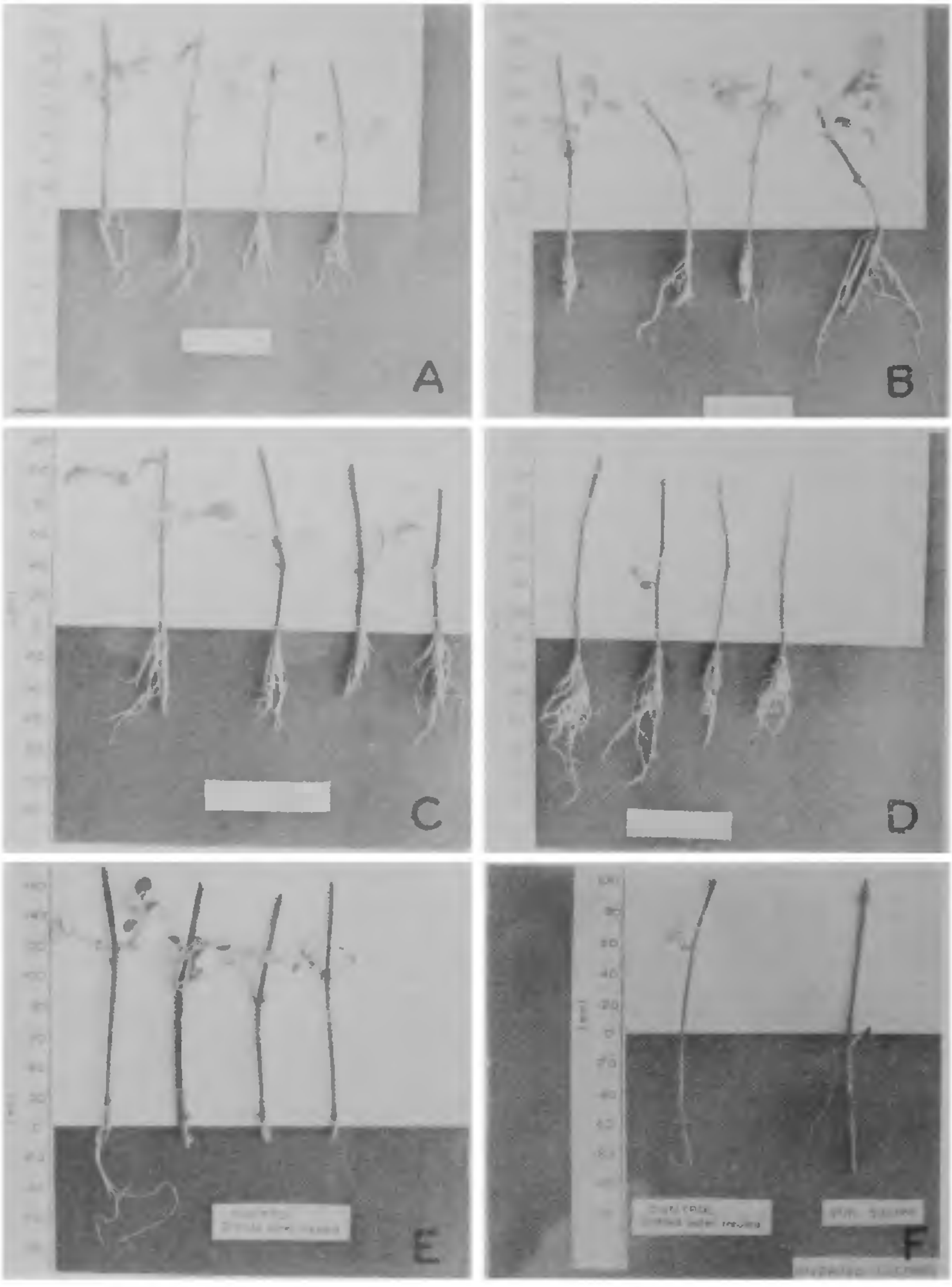

Figure 3.A–F. *Aerva sanguinolenta.* **A** = 100 ppm, **B** = 500 ppm show better shoot and leaf growth, **C** = 1000 ppm, **D** = 2000 ppm show lower sprouting and higher rooting in cuttings, at this level shoot growth inhibited. **E** = Control show lower rooting percentage. **F** = Inverted Cuttings–no rooting in Control, note that roots formed from the node of cutting treated with Stik 500 ppm.

al[9], Jarvis and Booth[10] and Jarvis *et al*[11], who noted that initiation of roots in the stem cuttings of *Phaseolus areus* is stimulated by auxin, although an adequate supply of boron is necessary for the formation of the root primordia as well as their subsequent growth. The profuse rooting in *A. sanguinolenta* by Stik indicates that there is low endogenous level of auxin in the stem cuttings and by stimulating the cambial activity, rooting is also augmented (*see also* Hejnowicz and Tomaszewski[12]).

Nanda *et al*[13] found that inverted cuttings of *Ipomoea fistulosa* rarely rooted, but produced root with auxin treatment. The present observations also indicate that roots emerged only in treated cuttings and there was no rooting in untreated ones. This shows the potential of Stik to maintain optimum level for auxins already present in the cuttings to initiate the cambial cells for the formation of the new root initials as observed in the present experiment.

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NEWS

GUARDING AGAINST SCIENTIFIC FRAUD

. . . "The history of the philosophy of science is the history of the question, Can we avoid error, fantasy, and deceit? . . . We need not guard science against error, only against fraud. The guardian of science against mistaken hypothesis is not the referee system or ethical committees but empirical experiment and the demand that each experiment be independently repeated before it be publicly and officially acknowledged. The guardian of society against fraud, however, is different. Usually fraud is a matter for the law. Ethical committees cannot replace laboratories that perform repetitions of scientific experiments and normally should not replace the system enforcing the law. Their function would be better restricted to the detection and elimination of suspected dishonesty with intent to defraud. As scientific deceit is often perpetrated with public money some such cases, concerning senior as well as junior researchers, ought to be referred to the court . . . . It follows that we need not protect science against any tempting idea, only against immoral scientific practices."

[(Nathaniel Laor (Yale U.) in *British Medical Journal* 290(6469).681–4, 2 Mar 85) (Reproduced with permission from Press Digest, *Current Contents*®, No. 21, May 27, 1985, p. 19. Published by the Institute for Scientific Information®, Philadelphia, PA, USA.)]