

Fluon barriers for confining non-flying insects in open containers

by

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RADINOVSKY and KRANTZ (1961, 1962), in the U.S., were the first to use Fluon as a barrier to mites and crawling insects. The authors of the present article have used it successfully over the past 18 months to confine red wood ants (*Formica rufa* L. 1761 and *F. polyctena* Foerst.) in open containers, and others have informed them of similar results with other insect species. A brief account and discussion of these findings may be useful to those wishing to try the same technique.

"Fluon" is the trade mark for polytetrafluorethylene (PTFE), manufactured by Imperial Chemical Industries in England. It is a non-toxic, thermoplastic polymer, which is completely inert at ordinary temperatures. The formulation used for insect barriers is Fluon GP1¹⁾, a milky-white aqueous suspension, stabilized with a non-ionic wetting agent. We found that an effective barrier to ants could be obtained by painting a band of the liquid on the vertical or slanting inside surfaces of plastic dishes, glass tanks etc. with a camelhair brush, and leaving it to dry at room temperature. The bands were 6 to 9 cm wide, but much narrower bands would probably have been equally effective. The white coating adhered well to all the materials tested: glass, various plastics, tin, zinc, enamel and stainless steel, but gave off a white powder on being rubbed with the fingers. Light rubbing, however, did not immediately impair the barrier. Barriers to ants remained effective for several months, even where they frequently came into contact with earth and nesting material. Where no such contact occurs they may be expected to last much longer. The surface to be treated with Fluon must itself possess a certain degree of smoothness. Ants were seen to escape along a thin strip of rough putty in the corners of tanks made of glass panes in an iron framework, even though the corners had been carefully treated. No escapes occurred if all-glass tanks were used.

Fluon is more convenient than paraffine oil or glycerine, two substances which have also been used as ant barriers. The former is difficult to remove, whereas a coating of Fluon can easily be washed off with water. Both paraffine oil and glycerine remain sticky and tend to collect dust and to "run" at higher temperatures. Talcum powder has also been used successfully and does not have these disadvantages, but barriers made with this substance soon become ineffective when touched by the fingers and on coming into contact with earth and nesting material. A barrier consisting of an electrically heated wire proved a complete failure. The temperature of the wire had to be raised to a point where the ants were provoked to attack it, thus causing them to be burnt.

¹⁾ Fluon GP1 (GP = General Purpose) is obtainable in the Netherlands from "I.C.I. (Holland)", Wijnhaven 107 (Postbus 551), Rotterdam. The current price is Dfl. 26.30 per pint, or 0.54 l).

Miss C. V. HORDIJK of the Itbon found that heather beetles (*Lochmaea suturalis* Thoms.) can also be confined within Fluon GP1 barriers (personal communication), and Mr. P. FUCHS found the same with regard to German cockroaches (*Blattella germanica* (L.)) while at the Plant Protection Service and with regard to the Collembolan *Onychiurus quadriocellatus* Gisin while at the Itbon (personal communication). In the first case the dispersion had been applied with a brush, in the other two with a pad of cotton.

RADINOVSKY and KRANTZ (1961), however, found that the granary mite *Leiodinychus krameri* Can. could ascend Fluon-coated vertical glass surfaces if the Fluon had been applied by means of a brush. This was attributed to minute imperfections of the surface of the coating. Far better results were obtained by dipping the vials used by them in the dispersion, whereupon the resultant film was much smoother. None the less, 100% confinement was only obtained after three successive dips, alternated with periods in which the coating was allowed to dry. On the other hand, one dip sufficed for barriers to the granary weevil (*Sitophilus granarius* L.) and the saw-toothed granary beetle (*Oryzaephilus surinamensis* L.) (RADINOVSKI and KRANTZ (1962).

In industrial applications Fluon is always sintered. The powdery film then turns into a firm, almost transparent skin with an extremely low coefficient of friction. RADINOVSKI and KRANTZ (1961), however, found that heating in an oven at two different temperatures (200°—220° C and 220°—223° C) or heating in a bunsen burner flame rendered the barrier ineffective when tested with mites. This agrees with the results of experiments carried out by the authors of the present article, in which Fluon coatings became traversable to ants after sintering in an oven ¹⁾ at about 400° C or in a bunsen burner flame.

EBELING and WAGNER (1963) found that *Blattella germanica* and *Oryzaephilus surinamensis* could be confined within barriers made with a "very similar" dispersion, Teflon 30, which is manufactured by Du Pont de Nemours. Barriers proved effective when the liquid was applied to the walls of glass vials and then allowed to dry. However, it was found that "processed sheets of Teflon FEP fluorocarbon film" could be climbed by insects capable of ascending a glass wall, although the surface of these sheets, as of sintered Fluon, has an extremely low coefficient of friction. EBELING and WAGNER therefore suggest that the effectiveness of non-processed and therefore powdery films of Teflon and similar substances is not due to their smoothness, but to the breaking loose of minute particles under the tarsi of the insects, thus causing them to slip. The results with sintered and non-sintered Fluon confirm this suggestion.

EBELING and WAGNER stated that powdery films of Teflon lose their barrier properties with prolonged exposure to highly humid atmosphere; this we also found to be the case with Fluon. Fluon barriers regained their effectiveness after transfer to a dry atmosphere.

¹⁾ The authors are grateful to the "Bedrijfslaboratorium voor Grond- en Gewasonderzoek" at Oosterbeek for heating a Fluon GP1-coated stainless steel dish in one of their ovens.

Summary

In addition to species mentioned by other authors, ants (*Formica rufa* L. 1761 and *F. polyctena* Foerst.), heather beetles (*Lochmaea suturalis* Thoms.), German cockroaches (*Blattella germanica* (L.)) and the Collembolan *Onychiurus quadricellatus* Gisin can be confined in open containers by means of barriers made with "Fluon GP1". Although Fluon is always sintered in industrial applications, experiments by the present authors and others have shown that barriers for the confinement of insects, etc. are rendered ineffective if so treated.

References

- EBELING, W. & R. E. WAGNER, 1963, Teflon as a barrier to insects. *J. econ. Ent.* 56 : 715—716.
 RADINOVSKY, S. & G. W. KRANTZ, 1961, The biology and ecology of granary mites of the Pacific Northwest. II. Techniques for laboratory observation and rearing. *Ann. ent. Soc. Am.* 54 : 512—518.
 RADINOVSKY, S. & G. W. KRANTZ, 1962, The use of Fluon to prevent the escape of stored-product insects from glass containers. *J. econ. Ent.* 55 : 815—816.

Sangiococcus gen. nov. (Homoptera, Coccoidea)

by

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In a paper on scale insects from Dutch New Guinea (*Beaufortia* 8 : 126—143), published in 1961, I erected a new genus, *Haematococcus*, for two new species of Eriococcidae.

To my regret I have overlooked that the name *Haematococcus* had been used three times already for different Protozoa (AGARDH 1820/21, MORREN 1841, and BABES 1888); see S. A. NEAVE, *Nomenclator Zoologicus* 2 : 545.

In view of this preoccupation I propose to change the name *Haematococcus* into *Sangiococcus*, as one of the species was first collected on the island of Sangi (North Celebes) in 1927.

Cucullia absinthii L. (Lep., Noctuidae). Bij Heerlerheide stond in een plek *Linaria*, die ik in 1964 afzocht voor rupsen van *Calophasia*, een armetierig *Artemisia*-plantje. Laat hier nu een rups van *absinthii* op zitten! Dat was toch werkelijk een belevens. Vlak bij lag een soort van opgehoogd bouwterrein met een oerwoud van *Artemisia*. Dank zij de hulp van vrouw en kroost had ik in de tijd van een half uur 45 stuks. We hebben niet meer dan hooguit 10% van het terrein afgezocht, zodat er geen sprake van is, dat we de hele populatie daar hebben uitgerooid. Bovendien waren bulldozers bezig het terrein te egaliseren.

Omdat ik nu wist hoe de rupsen gezocht moesten worden, heb ik er beter op gelet met als resultaat, dat ze eigenlijk overal bleken te zitten: Kunrade, Cadier en Keer, Gronsveld, Epen. Overigens is er van die 45 rupsen niet veel terecht gekomen. Zes zijn verpopt, de rest was door sluipvliegen aangestoken.

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