during all the readings. With this volumeter, measurement can also be made of objects that float.

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PHENOL AS A TERMITE REPELLENT

TESTS previously reported[1] and still in progress, in preventing the attack of the West Indian dry-wood termite, *Cryptotermes brevis* (Walker), on most susceptible woods, indicate the value of heavily chlorinated or brominated compounds of phenol. Hexachlorophenol proves to be not as good as pentachlorophenol, but if substitution is made with copper, the resulting copper pentachlorophenate is much superior in repelling termites. Other metals of somewhat lesser value for this purpose, tested as sulfates, nitrates, chlorides, bromides and acetates, but not in other organic compounds, are zinc, ferric iron, cadmium and antimony. Minute amounts of some mercuric and mercurous salts initially make impregnated wood almost as powerfully repellent as do cuprous and cupric, but in the course of weeks or months, termites are able to eat the treated woods with impunity. Red mercuric iodide dissolved in acetone makes wood so toxic that termites die before they can crawl off the treated sample, but the wood quickly fades to its normal color and is then no longer either toxic or repellent.

Repeated tests with phenol, not in combination, indicate that its effect on the termites disappears even more rapidly. Service and laboratory tests of the phenolic glue used in the manufacture of plywood show that the termites usually begin feeding where the glue holds the sheets of wood together, although structurally this is not a point of weakness. Indeed, by comparison with other coal-tar constituents, phenol would seem one of the least promising upon which to build, except solely on the basis of low initial cost, to produce the ideal termite repellent.

[1] *Caribbean Forester*, 4 (4): 145–57, July, 1943, and 5 (4): 171–80, July, 1944.

Against the dry-wood termite, initial toxicity is of little importance as compared with permanence in remaining repellent, in which fluorene, phenanthrene, fluoranthene and pyrene are greatly superior (see Table 1).

The maximum effectiveness for this particular purpose would presumably be obtained by a combination of some of these organic compounds with the repellent metals. Or, if by heavy chlorination the relatively cheap naphthalene can be made to retain more permanently its initial toxic and repellent characteristics, the result of combination with the metals might be preferable even to copper pentachlorophenate. So far as known, none of the suggested compounds is commercially or even experimentally available. But if the entomologist can record and interpret the reactions of the termites, the research synthetic chemist should be able to take advantage of this information and produce such compounds, specifically designed to protect susceptible wood and wood products from termite attack.

TABLE 1

DAYS AFTER SUBMERSION TEN MINUTES OF WOOD SAMPLE BEFORE ATTACK BY THE WEST INDIAN DRY-WOOD TERMITE, *Cryptotermes brevis* (WALKER)

Dilution of	0.01%	0.02%	0.05%	0.1%	0.2%	0.5%	1%	2%	5%	10%
Phenol								2	3	4
Orthochlorophenol								4	7	9
p-Bromophenol							7	10	12	–
2,4-Dibromophenol							7	16	18	–
Tribromophenol							3	12	14	–
Thiophenol							8	10	13	–
Pentabromophenol					5	14	uneaten to date			
Pentachlorophenol				10	13	273	337	uneaten to date		
Hexachlorophenol					5	7	uneaten to date			
alpha-beta-Methylnaphthalene							6	9	12	–
3,5-Xylenol							4	54	–	
Fluorene						5	7	73	–	
Phenanthrene					4	7	8	87	–	
Fluoranthene			9	10	24	25	31	360	–	
Pyrene			2	4	19	25	182	195	–	
Copper Pentachlorophenate	27	42	uneaten to date							

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