POSEIDON
INSECT REPELLENT

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Poseidon's discovery of MR-08, a safe, menthol-derived compound shows promise as an effective Insect repellent.

- **Against mosquitoes, MR-08 enhances and extends the repellency of existing formulations and shows efficacy comparable to DEET**
- **Against houseflies, MR-08 prevents flies From landing**
- **In tropical jungles, MR-08 prevents leeches From attaching**
- **MR-08 is also proven in repelling nuisance and destructive insects such as stable flies, ants and termites**

MR-08 presents a new market opportunity for consumer repellents and the pest control industry.

Our Company's Profile

Poseidon Sciences' primary goal is the discovery of biochemicals and eco-friendly technologies with important applications to human existence. The active search for these technologies provides unique opportunities for our company, our shareholders and strategic partners. (For more information about Poseidon, please visit our website [www.poseidonsciences.com]).

To understand the processes influencing insect ecology and behavior, Poseidon embarked on an ambitious project that began in 1990 to identify a wide variety of natural biochemicals with the objective of selecting compounds that may be used in practical situations.

Analogues of natural compounds that showed promising results were evaluated for improved efficacy under laboratory conditions. The selection of these compounds took into account their potential for further development, their impact on the environment, and their safety for human use. At Poseidon's field laboratories in the U.S. and in tropical countries, standard procedures for screening chemical candidates as repellents using a wide variety of insect species were developed.

The Development of MR-08

Well-documented risks to human health, increased awareness on the toxicity of chemical pesticides, pest resurgence and resistance, environmental pollution and infrastructure degradation have prompted the search for environmentally-friendly, safe and non-toxic applications in pest management. Our work on the effectiveness of naturally-occurring chemical compounds for use as insect repellents contributes significantly to this search.

As a "generally recognized as safe" (GRAS) compound, menthol would have been an ideal eco-friendly material for a repellent. But studies have documented its low repellent potency. Depending upon formulations and concentrations, the repellent effect of menthol and its isomers are generally less than one hour and therefore are unsuitable for effective use.

However, a novel compound derived from menthol has now been identified. This compound, menthol propyleneglycol carbonate (MPC), demonstrated a high efficacy as repellent against a variety of insect species. It is referred to on Poseidon's inventory and in succeeding references in this brochure as MR-08. MR-08's structure is shown in Fig. 1.

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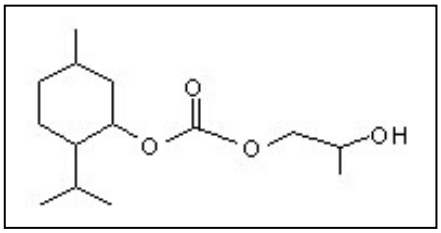

Fig. 1. Structure of MR-08

MR-08's potential as mosquito repellent

Mosquito and Fly Repellents

Potent vaccines against malaria, dengue fever, and the West Nile virus have yet to be discovered. In October 2004, researchers reported that a vaccine against malaria known as RTSS was the first ever to prove that it can save children from infection or death but further investigation and testing are required. As shown in Fig. 2, the completion of human trials for RTSS is scheduled for 2013.

In the temperate zone, concern about mosquitoes, ticks and the pathogens that they carry has increased. The science journal *Nature* in May 2001 noted that the mid-Atlantic and southern New England states — places where vector-borne diseases were rare — have been hard hit.

While ineffective against the Anopheles mosquito that transmits malaria, recent studies conducted by medical entomologists show that the chemical DEET *(N,N-diethyl-m-toluamide)* which is found in varying concentrations in most mosquito repellents on the market today is still the most effective in driving away mosquitoes, including *Aedes aegypti* , the species that carries yellow fever. Concerns over DEET's safety have diminished. However, repellents containing DEET tend to be sticky, have an unpleasant smell, burn when it gets into eyes and on lips, and tend to melt plastic objects and synthetic fabrics that it comes into contact with.

Repellents based on plant extracts such as Citronella perform poorly in keeping away mosquitoes and bugs. But there is promising research in the U.S. on the repellent properties of a substance found in tomatoes. To date, preventive approaches – such as improved sanitation and hygiene practices, the control of breeding grounds for vector mosquitoes, the use of insecticide-treated nets or the application of mosquito repellents – remain the best option for combating transmission of these mosquito-borne diseases.
For houseflies, insecticides take the form of flying insect killers in aerosol and liquid form, as well as fly paper and traps. The sprays affect flies directly or spatially, when their active ingredient dissipates in a room and flushes out flies in their hiding places; and also residually. Other forms of fly repellent include light traps and electric zappers.

Major Malaria Vaccine Efforts

Vaccine Units	Malaria Vaccine	Description	Development Stage
RTS, S	Liver	Malaria proteins fused to hepatitis-B virus particle	Advanced human trials may complete development by 2013
Modified vaccinia virus Ankara (MVA)	liver and blood	Prime-boost viral DNA vaccine	Early human trials
MSP1, MSP2, MSP4, MSP5 and AMA1	Blood	Traditional vaccines that will include several promising proteins	Animal trials / early human trials
MUST DO	liver and blood	Prime-boost viral DNA vaccine	Animal trials
BCG	liver and blood	Weakened tuberculosis is bacteria wearing malarial proteins	Concept stage
Whole attenuated	Liver	Weakened malaria Parasites grown in mosquitoes	Concept stage
GPI toxin	Blood	Parasite's carbohydrate toxin	Concept stage
Chitinase	Mosquito	Anti-transmission vaccine	Concept Stage

Fig. 2. The status of malaria vaccine trials

Source: New Scientist / 5 July 2003

The Risks to Human Health from Mosquitoes and Houseflies

Mosquito- and fly-borne diseases are still plaguing the world today. Among the notorious diseases carried by mosquitoes is dengue fever, which infects 50 million every year and causes deaths among five percent of victims. Another is yellow fever, which infects 200,000 people, killing more than 30,000 worldwide. In recent years, the West Nile virus, carried by the mosquito species, *Culex pipiens,* has emerged as a scourge, causing high fevers, neurological problems and even death. This virus killed 264 people in the United States in 2003.

And there is malaria, a debilitating, often fatal disease transmitted by the female Anopheles mosquito, which continues to be one of the world's most infectious killers well into the 21st century. The World Health Organization (WHO) estimates that 40 percent of the world's population, especially in the world's poorest countries in sub-tropical and tropical regions, is threatened by malaria. Two million die from it, most of them children under the age of five.

In droves, flies are a nuisance by disturbing people during work and at leisure. But the health hazard they pose is constantly alarming. Flies spread diseases as they feed on food for human consumption and on filth. The fly carries disease-causing organisms on itself and within, and transmission of the disease occurs when the fly lands on people or their food.

Among fly-borne diseases, the more common and prevalent ones include dysentery, diarrhea, typhoid, cholera; eye infections, poliomyelitis and certain skin infections. About 10 million children in the developing world die each year due to diseases that can be prevented through proper sanitation and nutrition techniques. Diarrheal disease for instance, is among the top five causes of deaths among children under five years of age.

MR-08's efficacy alone and in combination with other formulations

MR-08's protection time for human beings against mosquito bites was tested in the laboratory. Adult mosquitoes *(Culex quinquefasciatus)* were kept inside a screened chamber measuring 2 ft x 2ft x 2ft at a density of 200 mosquitoes per chamber. The mosquitoes were aged 3 to 10 days after emergence from larvae and starved for 24 hours prior to each test. The tests involved volunteers each inserting an arm treated from the elbow to the tips of the fingers with a formulation containing MR-08 mixed with a Pond's-type base cream into the mosquito-filled chamber.

The data in Fig. 3 showed that MR-08 was superior to menthol and other isomers with a protection time of approximately 280 minutes. All other compounds show protection time from bites of about 60 minutes or less.

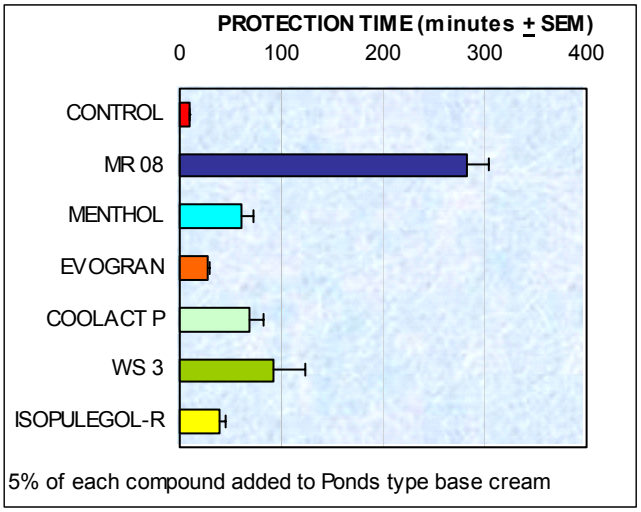

Fig. 3. Comparison of the efficacy of MR-08 with menthol and menthol isomers against mosquitoes.

The effectiveness of MR-08 is dependent on the formulation used. Fig. 4 compares the performance of MR-08 in various formulations. When combined with a hydrophilic ointment (Fougera ointment) or other types of lotions, the performance of MR-08 at the same concentration was not dramatic as in Pond's-

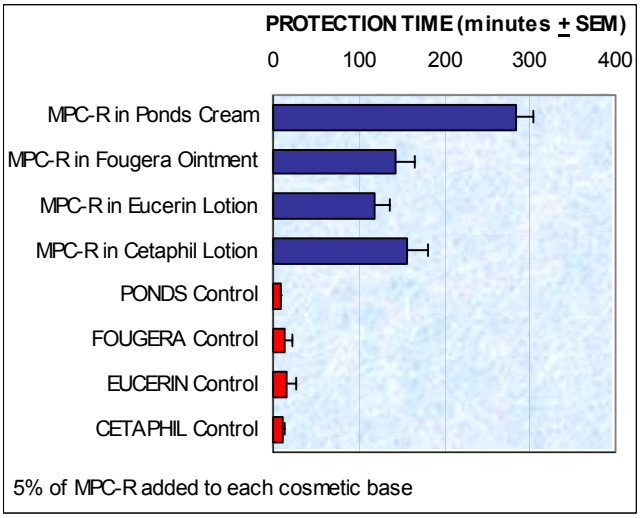

Fig. 4. Protection Time of MR-08 combined with other formulations (referred to as MPC-R in this graph).

A dose-response relationship of MR-08 in Fougera ointment is shown in Fig. 5. MR-08 at 40% is as effective as Bayrepel (Autan) and OFF! (SC Johnson, containing 95% DEET). Considering that Fougera ointment is not the best formulation for this product, it is encouraging that improvements in formulation will likely result in better performance of MR-08 as a repellent.

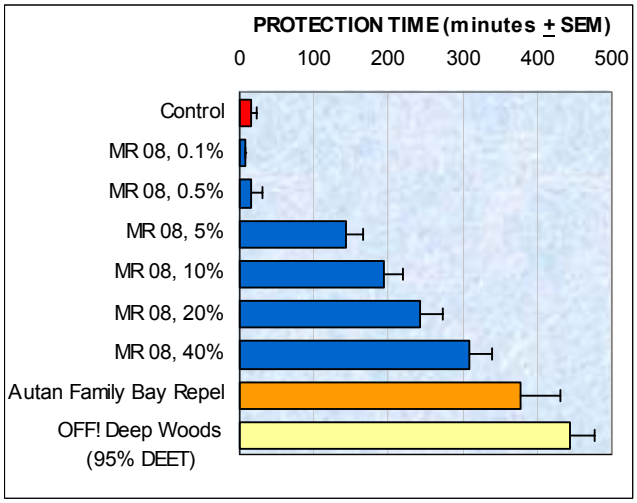

Fig. 5. Comparison dose response effect of MR-08 in formulations.

MR-08's efficacy in combination with DEET and Citronella

To test the effectiveness of MR-08 in enhancing the effect of DEET against mosquito-biting activity, we combined MR-08 with DEET (purchased from Sigma-Aldrich). In the experiment, the two chemicals were added at 10% w/w in an ointment base (Fougera) and applied on the arms of human volunteers. The arms were inserted inside a mosquito chamber and the protection time was determined. The data shows that the addition of 10% MR-08 in an ointment base with DEET resulted in greater protection time than either of the two active compounds alone.

To test MR-08's ability to enhance the effect of an already-existing mosquito repellent product, an experiment was undertaken in which MR-08 was added at a concentration of 10% w/w to a citronella-based product (Natrapel, manufactured by Tender Corporation of Littleton, New Hampshire). Citronella oil is a malodorous natural extract from the leaves of the plant, *Cymbopogon nardus*, with insect repellency properties. MR-08 increased the protection time of Natrapel from 23 minutes to 108 minutes (see Fig 6), This demonstrates MR-08's efficacy in enhancing the repellent effect of formulations containing citronella oil.

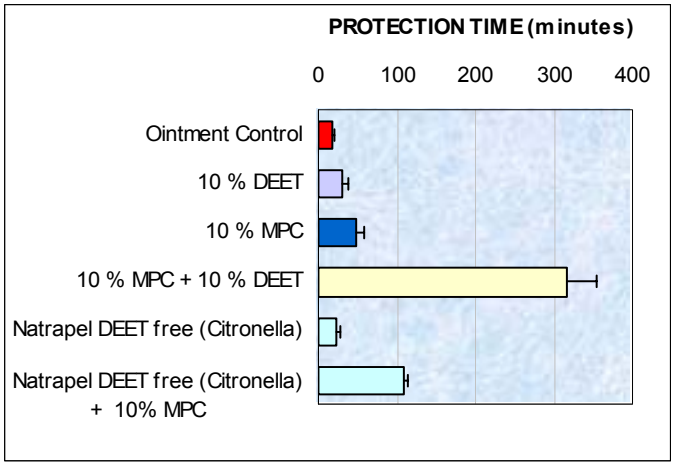

Fig. 6. The efficacy of MR-08 (referred to as MPC in this graph) in combination with 10 % DEET is represented by the yellow bar. Efficacy of MR-08 in enhancing Natrapel's repellency is represented by the light blue bar at the bottom.

MR-08's performance in outdoor mosquito tests

To validate the efficacy of MR-08 under natural conditions, MR-08 was mixed in an ointment base at 10% w/w and applied to the exposed arms of human volunteers who remained outdoors during the peak period of mosquito biting beginning at 3:00 PM. The protection time was also compared to another group of volunteers using a commercially available insect repellent (OFF! Skintastic with 7% DEET, manufactured by SC Johnson & Sons, Inc. of Racine, Wisconsin). Control ointment consisted of Fougera ointment without any active ingredients.

Table 1 show that MR-08 at 10% is similar in efficacy as OFF! Skintastic demonstrating that results of MR-08's efficacy in the laboratory can be duplicated in field conditions.

Table 1. Comparison of MR-08 and OFF! Skintastic protection time against mosquitoes in the outdoors.

STUDY GROUP	PROTECTION TIME (minutes ± SEM)
Control (Fougera Ointment)	10 ± 3
OFF! Skintastic	194 ± 4
10% MR-08	227 ± 9

MR-08's effect on houseflies

Houseflies are nuisance insects in most tropical and subtropical environments. To test MR-08's efficacy against houseflies *(Musca domestica)*, a test was designed in which houseflies were attracted into an enclosed room by placing food on the table.

Once a population of houseflies was present, screens were placed and the test food, in this case, pieces of meat, was sprayed with MR-08 at different concentrations. Fig. 8 below shows a dose-related inhibition of housefly landings prevented by MR-08 sprays. Figs. 9-10 illustrate the efficacy of MR-08 versus the control in preventing housefly landings.

Fig. 7. *Musca domestica*

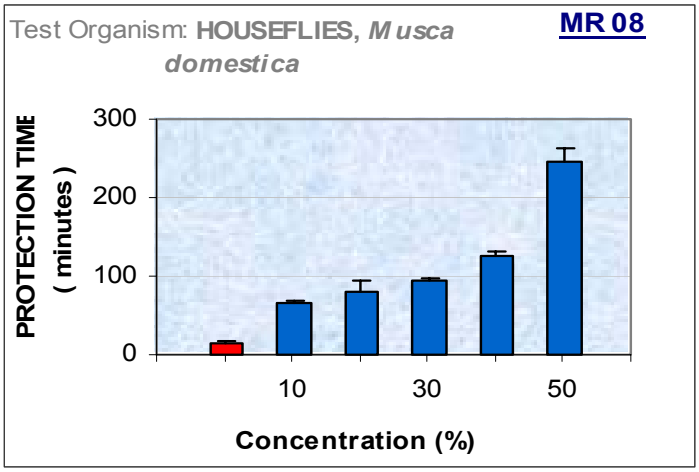

Fig. 8. MR-08 repellent effects against houseflies.

Fig. 9a. Fish treated with MR-08 (20% spray)

Fig. 9b. Control

Fig. 10a. Slice of mango treated with MR-08 (20% spray).

Fig. 10b. Control

MR-08's effect against leeches

The use of medicinal leeches *(Hirudo medicinalis)* has made a comeback in recent years following approval of their use in patients with vascular problems and those requiring skin graft and reconstructive surgeries.

Fig. 11. *Hirudo medicinalis*

But for most people, particularly to adventurers or military troops operating in tropical jungles, leeches are considered a problem.

A study was conducted to determine if leeches could be prevented from attaching through the application of MR-08 on the skin. The bottom of plastic petri dishes were coated with various concentrations of MR-08 and allowed to dry. Water was added to the coated dishes. One leech was immersed in each dish and their behavior was observed and recorded on video. The leeches became agitated in a matter of seconds and eventually crawled out of the petri dishes. The level of agitation was subjectively recorded using an index, with "0" being no agitation to "4" being vigorous movement. The data in Fig. 12 show that the level of agitation is dose-dependent. The time elapsed from the introduction of the leech into the dish and the time the leech crawled out was also recorded. Again, the data in Fig. 13 show a dose-related response to MR-08.

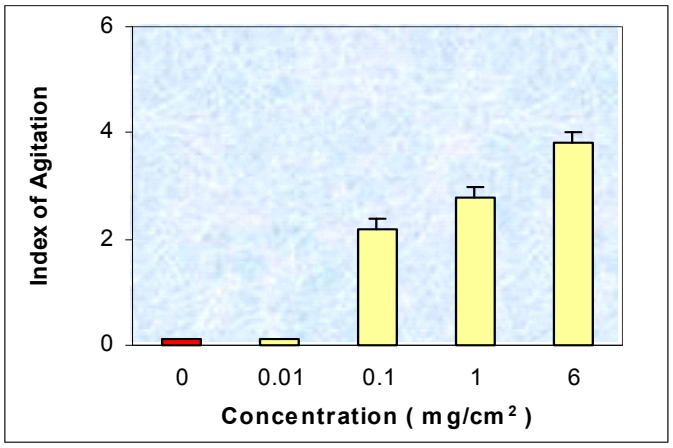

Fig. 12. Increased concentrations of MR-08 increased the level of agitation of the leeches.

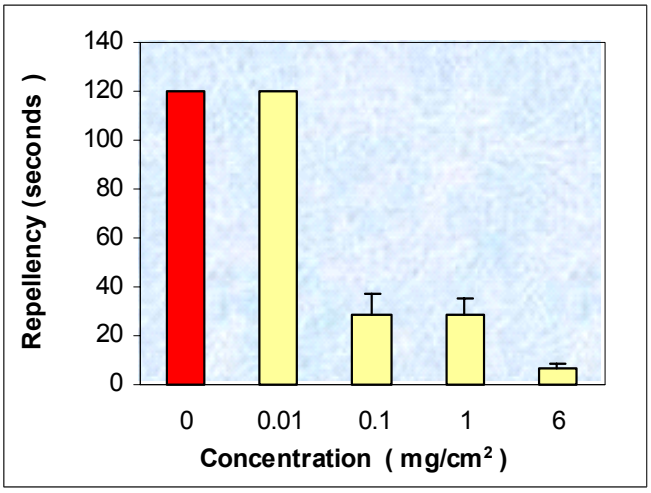

Fig. 13. The increased concentration of MR-08 repelled leeches from the skin in as little as 4 seconds.

A study was also performed using a human volunteer. One arm was occluded with an Ace bandage leaving two open areas of the skin measuring 3 cm by 5 cm (Fig. 14). The exposed area on the right was treated with MR-08 and the area on the left treated with an ethanol vehicle serving as a control. It was observed that leeches do not attach to the MR-08 treated skin on the right area, but readily attached to the control side as shown in the left area of the arm in Fig. 14.

Fig. 14. The leech on the left attaches itself in the absence of MR-08. The leech on the right wriggles out in response to the MR-08.

MR-08's potential as a livestock pest repellent

Pest Control for Agricultural Livestock

The agricultural livestock industry combines various production practices with monitoring of pests and uses a variety of methods to control pests. In some U.S. regions, a commonly used method is introducing wasp parasites for fly control in and around livestock areas. Other regions utilize rotational grazing, breeding pest-tolerant animals, or manure management with strict sanitation regulations. However, the government has stiff penalties for meat and poultry products that have unacceptable levels of pesticide residues, which can enter the livestock due to a direct application, injection, or ingestion of contaminated feed.

There are no figures available specifically for the market for pesticides used for livestock, as they are considered part of the agricultural market sector which includes crops. Expenditures on pesticides in this sector have more than doubled to $7.6 billion dollars in 1999 since 1980.

Stable Flies

Of more than one million establishments in the U.S. dealing with agricultural livestock, 78 percent are devoted to cattle, and account for an annual $60 billion dollars in beef and dairy sales. Among the problems affecting dairy cattle and other agricultural animals is the stable fly *(Stomoxys calcitrans)*, also known as the dog fly. Because of the popularity of horse breeding, these flies are now also a major problem in horse stables as well.

Stable flies feed by piercing the skin and sucking the blood, causing pain and discomfort to farm animals. Stable fly infestation causes weight loss in cattle by as much as 25% and decreases milk production by as much as 60%. In the absence of animals, stable flies will also attack humans.

Fig. 15. Stable fly *(Stomoxys calcitrans)*

MR-08's inhibiting effect on livestock pests

Effect on Stable Flies

To test the effectiveness of MR-08, a 50% solution was prepared in 95% ethanol. Stable flies were collected by placing a screened cage containing bait beside a horse stable one day prior to the test. Approximately 200 stable flies were collected from each cage. The test bait used was pieces of beef placed in an aluminum pan at the bottom of the collecting cage. One piece was sprayed with the MR-08 solution using a standard spray bottle, while the other bait was sprayed with a control solution made of ethanol only. The test was conducted in duplicate and the number of stable flies landing and feeding on the meat was counted periodically.

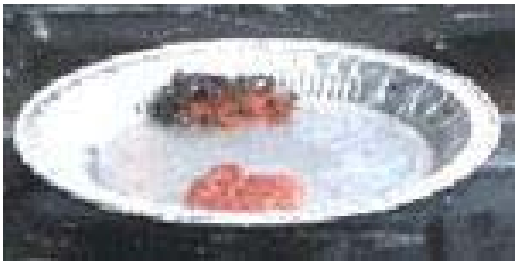

Fig. 16a. Inhibition of stable flies landing using MR-08 spray (50% in ethanol)

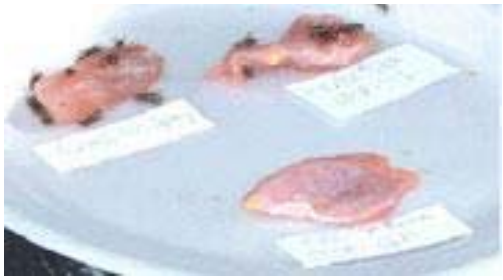

Fig. 16b. Inhibition of stable flies landing using MR-08 spray (50% in ethanol)

The data in Table 2 show that MR-08 was effective in preventing stable flies from feeding on the meat treated with MR-08. Although one or two flies landed on the treated meat, these flies did not linger to feed but moved on immediately. In the control group, the flies landed immediately and increased in numbers. The MR-08 spray remained very effective for at least five hours, losing its efficacy by the ninth hour from the initial single application.

Table 2. Effect of MR-08 on stable flies.

Number of flies landing on the bait		
TIME (minutes)	**CONTROL**	**EXPERIMENTAL**
1	3	0
5	8	0
30	15	0
60	>30*	0
120	>30	0
180	>30	1
240	12	0
300	>30	1
540	>30	>30

MR-08's potential as a nuisance pest repellent

Home and Garden Products

Agricultural usage for insecticides traditionally comprises a significant part of the insecticide industry. In terms of non-agricultural home and garden usage for insecticides in the U.S., expenditures rose 19 percent from a year ago to 1.2 billion dollars in 1999, and by 92 percent from 1980. The number of American households using insecticides totaled 58 million, while those using repellents totaled 52 million in 1999.

However, the use of insecticides has run afoul with state governments. In July 2004, New York, Connecticut, Illinois, New Mexico, Wisconsin and the U.S. Virgin Islands filed in joint lawsuit against the federal U.S. Dept. of Housing and Urban Development (HUD). They are attempting to reduce the use of pesticides in public housing. The lawsuit contends that the HUD has failed to comply with a 1996 law requiring the use of safer pest management practices in public housing developments. This case highlights the dilemma of advocates of integrated pest management methods, who want pests eradicated without using toxic pesticides.

In dealing with the troublesome fire ant, entomologists at Texas A & M University have found a microorganism that kills these ants. They are however reluctant to set this organism – a protozoa that is deadly to these ants – on the ant colonies, until further research is conducted. The protozoa shorten the ants' life spans and raises mortality of sexual females.

Damage by Nuisance Pests

The tropical fire ant *(Solenopsis geminata Fabricius)* is native to the United States. However, the more aggressive imported species of the fire ant *(S. invicta)* dominates the southern U.S. Fire ants are known to damage 57 species of cultivated plants. They feed on germinating seeds as well as other insects. They are attracted to electrical currents, and can cause considerable damage to heat pumps, air conditioning, telephone junction boxes, transformers and traffic lights. Fire ants are notorious for their stinging behavior and cause localized intense burning and scarring in humans.

Because it lacks natural predators in the U.S., the imported fire ant has spread to Florida, Georgia, South Carolina, Tennessee, Alabama, Mississippi, Arkansas, Texas and Oklahoma. This species is fast displacing other less insidious native ant species.

MR-08's effect on pharaoh ants

An experiment was designed to test the effectiveness of MR-08 against pharaoh ants *(Monomonium pharaonis),* a known household pest. Chocolate was placed on a table five hours before the test. Within two hours, the ants had established a route from the ground up the table legs. On the fifth hour, strips of filter paper measuring 2 inches by 7 inches impregnated with MR-08 were placed halfway up the table leg. Impregnated with in ethanol alone, the filter paper control was not able to prevent the ants from crossing the barrier.

Fig. 17. *Monomonium pharaonis*

But when MR-08 at 30 mg/cm^2 was applied to the filter paper, the ants were prevented from crossing this barrier for over 750 minutes without any toxic effects. (see Fig. 18 and Fig 19). Protection time was measured as the time the first ant crossed filter barrier.

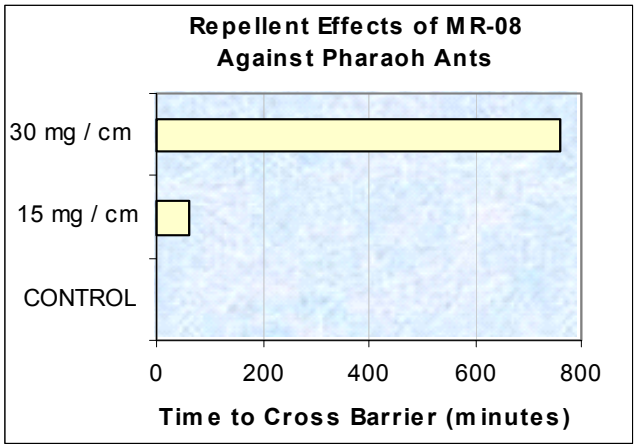

Fig. 18. MR-08 Repellent Effects Against Pharaoh Ants.

MR-08's effect on fire ants

In this study to test MR-08's effectiveness on the tropical fire ant, MR-08 was added to ethanol at a concentration of 50% (v/v). The control was composed of ethanol alone. Each study group was composed of 4 replicates. The solution was sprayed to the bait (peanut butter). The protection time was measured as the time when the first ant started consuming the bait. In the control, which was sprayed with ethanol alone, the fire ants *(S. invicta)* were seen on the bait within 3 minutes after the spray was applied (Table 3). The bait sprayed with the MR-08 solution was protected from fire ants for at least five hours. The experiment was terminated after five hours of observation.

Table 3. Effect of MR-08 on Fire Ants.

	PROTECTION TIME
Spray with ethanol alone (Control)	3 minutes
Spray with 50% MR-08	>5 hours

Fig. 19. Pharaoh ants prevented from crossing the barrier strip of filter paper impregnated with MR-08. The ants were able to cross after the MR-08 dissipated.

MR-08's potential as wood preservative

Wood Preservatives

The market for pressure-treated lumber stands at $4.0 billion dollars per year, according to the U.S. Treated Wood Council. The demand for wood protection coatings and preservatives is expected to increase just over two percent annually to total $3.0 billion in 2007, with the strongest growth seen in applications for interior products such as furniture and cabinets.

The building industry has long used lumber treated with chromated copper arsenate (CCA). The wood is pressure treated or impregnated with this chemical to preserve and protect it against termites and rotting. Aware of the risks of arsenic, a highly toxic metal and known carcinogen present in CCA, manufacturers of wood-preserving chemicals voluntarily agreed to phase-out CCA products in December 2003 in the United States. Since January 2004, CCA-treated products are no longer allowed for residential use.

The alternatives to CCA however – alkaline copper quaternary and copper azole, are expensive. With the withdrawal of CCA-treated wood for residential use, there is a potential market of 68 percent in the U.S. and Canada waiting to be filled by other viable, cost-effective alternatives. The U.S. Forest Service for instance, is developing a commercially-available naptha-based compound that works well to prevent decay-causing fungi and kill subterranean termites.

MR-08's effect on termites

Sand Barrier Test

The effect of MR-08 on the milk termite, *Coptotermes vastator,* was compared to DEET using the sand barrier test method.

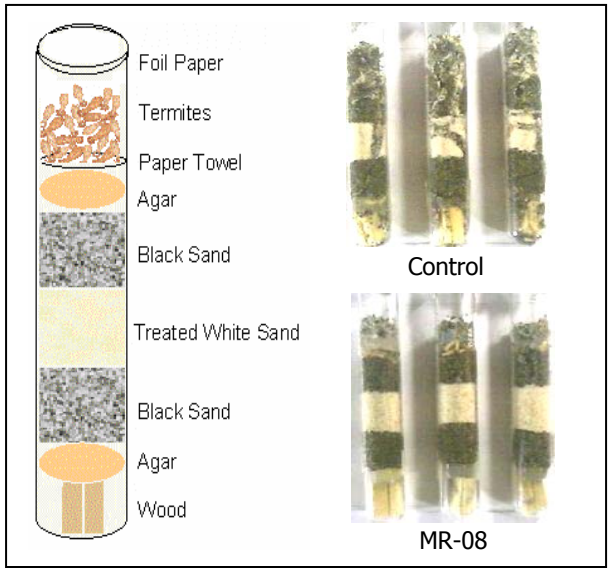

Figure 20. Comparison of the condition of the termites and the test wood blocks in the sand barrier test.

Figure 21 describes the distance traveled by the termites through the sand barrier. In the control group, the termites have reached the wood blocks by day 6 and burrowed to a distance of 7 cm. In MR-08 treated sand barriers, the termites remained stationary at 1 cm and no damage to the wood blocks until the termination of the test on day 12.

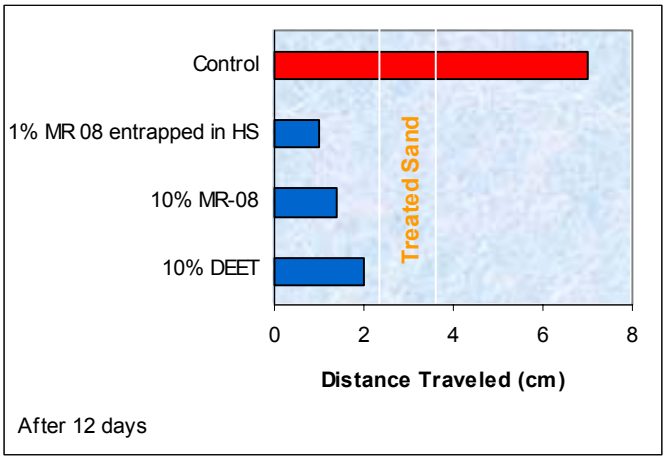

Figure 21. Comparison of the effect of MR-08, entrapped MR-08 in nanotubes and DEET in a sand barrier test.

Figure 21 shows that MR-08 is slightly better than DEET when tested in the sand barrier test. It is significant to note that when MR-08 was entrapped in a microtubule at one tenth the concentration, it produced a more effective inhibition of termite migration compared to the higher concentration of DEET or MR-08. This suggests that slow release technology may contribute to lower requirement of the active ingredient.

Wood Test

In this study, MR-08 was dissolved in ethanol at a concentration of 10% w/w and pieces of pre-weighed soft wood were immersed in the solution for 24 hours. Controls were represented by wood impregnated with ethanol alone. After impregnation, the wood was allowed to air-dry to remove the ethanol, which has a lower flash point. The dry wood was re-weighed to determine the total amount of MR-08 absorbed into the wood. The weight of MR-08 absorbed was 26 milligrams per gram of wood.

The wood test samples were placed on a termite mound under ambient natural outdoor conditions for a period of the study. At the end of the test period, the wood samples were cleaned of debris and termites, dried in the sun and weighed. Wood preservation was determined by the amount of weight loss during the test period.

Table 4. The protective effect of impregnating wood with MR-08 against termites. Mean ± SE of

Treatment Group	Percent Weight Loss
Control	26.6 ± 7.1
MR-08	0.8 ± 0.4

The data above shows that termites were able to destroy the wood in the control group within the period of the study. When periodically checked visually, termites are seen within the wood samples in the control group.

However, when MR-08 was impregnated into the wood, the termites were completely prevented from consuming the wood as evidenced by the minimal weight loss of the experimental wood samples. Fig. 22a & b show the photographs of the wood after exposure to termites.

Fig. 22a. Control (wood without MR-08).

Fig. 22b. Wood sample treated with MR-08. (The blue band is for identification purposes only).

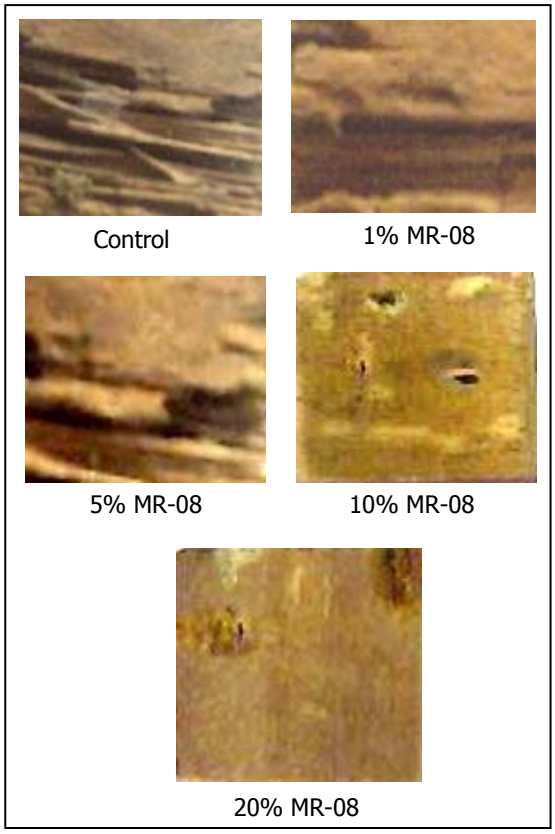

Figure 22c. Photographs of wood samples at four (4) months after single superficial impregnation of wood with various concentrations of MR-08.

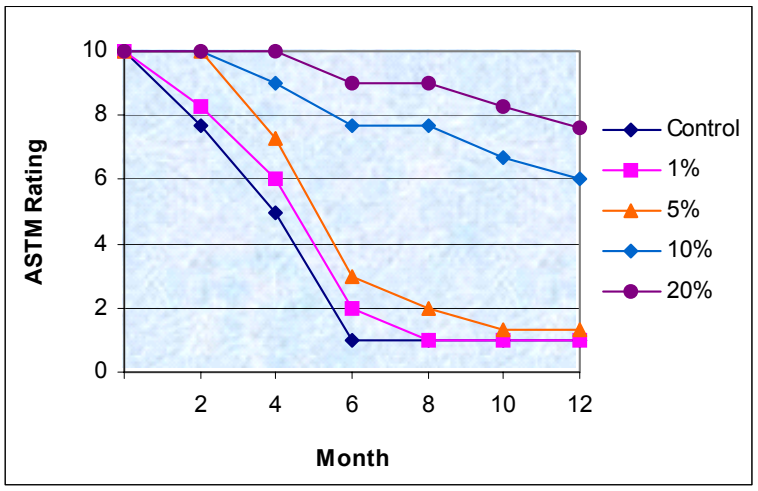

Fig. 22d. The effect of MR-08 at various concentrations in protecting wood substrates against termite damage. Standardized wood samples were impregnated with MR-08, placed in termite mounds. The samples were taken for evaluation at each month of exposure.

Figure 22d shows that the protective effect of MR-08 is dependent on the concentration used for impregnation. The study is in progress and shows effective protection at concentrations at higher doses of 10 and 20% after one year from a single superficial impregnation of the wood blocks with MR-08.

Prospects in Wood Protection

The above data demonstrates that superficial impregnation with MR-08 produced a long lasting effect on preventing attack by termites. In normal wood treatment, the active ingredients are pushed through the core of the wood under high pressure and vacuum. This enabled protection time of many years compared to the old method of dipping the wood in preservatives.

Poseidon expects that MR-08 will also show years of performance time when perfused throughout the lumber under pressure. By novel encapsulation techniques, MR-08 can remain inside the interstices of the wood to permit the slow release of the compound and further extending the life span of the wood. These studies are currently in progress.

MR-08 in varnish as termite repellent

The practical application of MR-08 in preventing termite infestation was evaluated by incorporating MR-08 in varnish at concentrations up to 10% (w/w). The varnish (Treasure Island Industrial Corp.) was applied on the surface of wood blocks, allowed to dry and placed on top of termite mound. The degree of damage to the wood blocks was evaluated periodically by visually rating each block according to ASTM rating system (ASTM D3345), wherein, a rating of 0 is a failure and 9 for light attack. The data shown in Table 5 below shows that MR-08 at concentrations of 5% and 10% applied one time only is sufficient to prevent termite from damaging the wood for at least 6 months. The study is still in progress.

Table 5. ASTM rating for wood treated with varnish containing MR-08 at various concentrations. Mean + SEM of 5 samples per group

Concentration of MR-08 in varnish	**Duration of exposure to termites**		
	month 2	**month 4**	**month 6**
Control	7.7 ± 0.3	6.7 ± 1.2	6.0 ± 0
1%	9.0 ± 0	7.3 ± 0.6	6.7 ± 0.6
5%	10.0 ± 0	9.0 ± 0	8.3 ± 0.58
10%	10.0 ± 0	10.0 ± 0	9.0 ± 0

Intellectual Property Rights

The international patent for MR-08 was published in 24 March 2005 (International Publication Number WO 2005/025313 A1). This PCT patent went into its national phase filings in key countries in March 2006.

Summary

The data described in this report show that MR-08 is an effective agent in preventing mosquitoes and leeches from biting as well as in repelling nuisance species such as houseflies, stable flies, fire ants, pharaoh ants, and destructive termites. MR-08 presents a new market opportunity for consumer repellents and the pest control industry.

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