A Menacing New Pollutant

By David Perlman
Science Correspondent

The peregrine falcon, a bird of prey that once abounded all over America, is bearing a bitter warning to man:

A newly-identified chemical pollutant has arisen on our planet; it threatens not only the existence of falcons and countless other birds, but its molecules are already entering the bodies of humans.

Its long-term hazards at low levels to the human species are wholly unknown — although in concentrated gaseous form the chemical is highly poisonous, and chemicals closely related to it are known cancer-causers.

In California the pollutant is widespread; in the San Francisco Bay Area, where many industries use many varieties of the compound, the chemicals have concentrated heavily.

The new pollution threat is a class of organic chemicals called polychlorinated biphenyls. Few laymen have ever heard of them, yet they

See Back Page

0631257

Bay Scientist's Pe[illegible]

From Page 1

are a major boon to industry: they are used in making ions form the chemical is paints and plastics, electrical insulators and rubber tires, waxes, sealants and epoxy resins.

Despite their widespread use, in America they are made only by Monsanto Chemical Co., which markets many forms of the compounds under the trade name of Aroclors.

They apparently enter the atmosphere and marine environment by vaporizing, venting from factory stacks, by waste discharge into waterways and even by the abrasive wearing of tires on highways.

Their chemical structure is very similar to that of DDT, the potent and long-lasting insecticide. Both DDT and the biphenyls are known as chlorinated hydrocarbons, and in the words of a Berkeley researcher they are now "the most abundant synthetic pollutants present in the global environment."

The Berkeley scientist is Dr. Robert W. Risebrough, a researcher at the Institute of Marine Resources in the University of California's Department of Nutritional Scientists.

Dr. Risebrough and a team of colleagues from Davis, San Diego and Cornell University in New York, have been alerting ecologists to the hitherto unsuspected prevalence of the biphenyl compounds and to their invasion of man's environment, of man's environment.

FALCON

They have published their findings in the British science journal Nature, in its American counterpart Science, and have discussed it at conferences on environmental poisons. Risebrough will be presenting more evidence on the problem at a La Jolla scientific meeting on the "Chemical Invasion of the Ocean."

In an interview with The Chronicle recently, Dr. Risebrough described the new pollution menace, and how he came upon it.

The tale is an ironic one, for it all started with the peregrine falcon. That bird, once described by an eminent ornithologist as "the embodiment of noble rapacity and lonely freedom," is now extinct as a breeding species in the eastern United States and southern Canada.

Its rapid population decline during the years right after World War II — when DDT was first introduced as a major pesticide — first served to alert ecologists that a new poison might be damaging the environment.

DDT

Investigations showed the falcon was succumbing by preying on birds that had ingested large quantities of DDT, a chemical that concentrates in animal fats. So the falcon, in a sense, was man's first messenger to carry the warning that DDT was befouling the world.

And just as Spartan kings slew their messengers who bore bad news, so the falcon is being slain today as it carries the news of the new chemical pollutant. Eighty percent of California's breeding peregrine falcons, Dr. Risebrough estimates, have now been destroyed.

It was barely two years ago that Dr. Risebrough, on an expedition to Baja California, found an unhatched, abandoned egg of a peregrine falcon. He analyzed the egg's contents, found DDT in it, and also found it contained another unidentified chemical.

PCB

Later that same Chemical was found in the fat of European birds and Swedish scientists identified it as a polychlorinated biphenyl, which was to gain its scientific notoriety as PCB.

Dr. Risebrough and his colleagues then began an exhaustive hunt for PCB in birds and fish along the West Coast. They are still at it.

They have found, for example, that PCB is present in almost all birds of prey, but its quantities are largest in those birds that feed on fish or fish-eating birds. The material, like DDT, apparently starts concentrating in the breast fats of the marine "food chain" — the microscopic one-cell plants eat animals — and becomes more and more concentrated as tiny fish eat plankton, bigger fish eat small fish, and birds eat bigger fish.

Peregrine preying on Pacific [illegible] have not visibly vanished [illegible] Risebrough reports. But several land colonies of [illegible] falcons, which prey mainly on ducks and shorebirds, still appear to be reproducing normally.

In hundreds of analyses of birds and fish eggs, Risebrough and his colleagues have found only about a tenth as much PCB as DDT among birds from relatively [illegible] areas. But in birds from the Farallon Islands the PCB quantities are higher — between a fifth and a half the DDT.

In birds and their eggs from polluted San Francisco Bay — falcons, gulls, terns and night herons — there is often more PCB than DDT.

Dr. Risebrough and his col-

0631258

PCB-ARCH0745700

...ant Warning

...ting in... the ma... the mi... nts and... ecumes... ntrated... on, big... sh, and...

...r. Pa... low vir... r. Risebrough... small in... ilforata... mostly... ds, still... pelicans...

...types of... Dr. Rise... ...roughs... ...phen... ...as DDT... ...activity... ...ts. Dr... ...illon Is... ...ands are... ...fifth and...

...ir eggs... ...ancisco... ...s. terns... ...there is... ...DDT.... ...his col...

leagues point out that all the chlorinated hydrocarbons, like DDT, cause enzyme changes in animal livers and that these new-formed enzymes break down many vital hormones, including sex hormones. In laboratory experiments with pigeons, using a biphenyl compound called Aroclor 1254, made by Monsanto, Dr. Risebrough's group has found the PCB is five times more powerful than DDT in its hormone-destroying activity.

The sex hormones, according to Dr. Risebrough, play an important role in calcium metabolism, and as a result of the pollution by PCB and DDT the eggs of birds like falcons are now far thinner and more fragile than they used to be.

HUMANS

The calcium-deficient eggs break prematurely and fail to produce hatchlings. Thus the decline of the falcon — the end of its evolutionary road. It had adapted over millions of years to its natural environment but it could not survive as a species in an environment altered by man's new chemicals.

And what of the effect of the biphenyl compounds in humans? The compounds have already been found, ominously, in the milk of mothers analyzed by Dr. J. H. Enderson and Dr. F. A. Boland at Colorado College, and Dr. Risebrough is now hoping to test for their presence among nursing mothers here.

As Dr. Risebrough has written: "They are highly toxic to man when inhaled as vapors, and the more heavily chlorinated compounds have greater toxicity. No tolerance limits have been set for human food supplies and their cancer-causing properties remain to be determined."

FOOD

Dr. Risebrough and his colleagues have found evidence that the biphenyls, like DDT, are carried widely across the oceans by winds and water currents. Arguments that they can be used safely because they remain localized, Dr. Risebrough says, are "misleading, irrelevant and wrong."

How the PCB compounds may affect human food supplies and human lives are questions for future research. The one certainty now is that they can be found everywhere, that they have invaded the food-producing levels of the oceans, and that their presence is rising swiftly.

Officials of the Monsanto company in St. Louis were asked for comment on Dr. Risebrough's report last week. After three days of queries a company spokesman would only say that top Monsanto scientists and sales executives were studying it.

Dr. Risebrough's fellow researchers attacking the PCB pollution problem include Dr. D. B. Peakall of Cornell; Steven G. Herman, a zoologist at Davis, Dr. Monte N. Kirven at the San Diego Natural History Museum, and Paul Reichel in the marine resources lab at Berkeley.

0631259

PCB-ARCH0745701