Outbreak of Equine VD Stirs Fear in Kentucky

Lexington. The Bluegrass country of central Kentucky, the world's richest spawning grounds for thoroughbred racehorses, has been shaken to its boots this spring by the appearance of a new venereal disease that could devastate the state's thoroughbred industry. With stud fees ranging up to $50,000, and annual yearling sales bringing in about $80 million, the slightest perturbation in Kentucky's breeding cycle can bankrupt some breeders and make waves throughout the industry worldwide.

The disease, which causes sterility in broodmares, was early on known laughingly as the "Silver Jubilee clap" when it was first identified last year in England. No one is laughing now.

On 8 March all hell broke loose when the first case of contagious equine metritis (CEM), as the disease has been christened, was positively diagnosed in Kentucky. On 14 March, a month into the breeding season, the Kentucky commissioner of agriculture slapped a 2-week ban on transport of horses for breeding purposes within the state. Breeding was cautiously resumed on the 28th, with a highly controversial stipulation: that breeding at any farm where CEM was suspected must be carried on through artificial insemination.

Such a precaution is nothing less than appalling to thoroughbred breeders—whose horses have never been allowed to mate in other than the natural way—but no preventive measures are deemed too extreme in face of a disease that could devastate the state's $1-billion-a-year thoroughbred industry.

The CEM organism is a highly contagious one which can be spread not only in sexual contact but laterally, by handlers and through contact with exposed materials. Stallions are not affected by it—they only act as carriers. In mares it causes infection of the lining of the uterus which results often in failure to conceive or abortion. Complicating attempts to define the extent of the spread of CEM (so far confined to Kentucky) is the fact that some mares are what a state official calls "Typhoid Marys"—they may have the disease but show no symptoms and even bear healthy foals while quietly spreading the infection to a stallion and on to other mares. Kentucky breeders have therefore been having nightmares about a low fertility rate this year that would reduce the number of foals produced next year, thus depressing yearling sales the following year and generally producing economic havoc. Columnist Jimmy Breslin poignantly summed up the worst case when he wrote: "If the disease shows up some more, breeding most certainly would be stopped perhaps for the season, and a couple of years from now there would be no 2-year olds racing. The year after that, the famous races for 3-year olds, the Kentucky Derby, Preakness, and Belmont Stakes, would have Arkansas hogs running in them."

So far, panic seems unjustified. As of this writing, CEM has been discovered in 5 stallions and 24 mares. About 40 additional mares are suspect because they were bred to the infected stallions before the disease was discovered. Cultures are now pouring into the University of Kentucky's (UK) animal pathology lab—where a special CEM laboratory has been set up—at the rate of 100 a day, according to UK pathologist Thomas Swerzcek, who is in charge of the testing program.

Circumstances now appear to favor orderly resumption of breeding—surrounded by a newly arranged and elaborate set of precautions—but only after 3 weeks of finger-pointing and near hysteria among some breeders, and exhausting 15-hour days put in by agriculture commissioner Thomas Harris and state veterinarian Tom Maddox, endless meetings with horse people, and consultations with British veterinarians and U.S. Department of Agriculture (USDA) officials.

The CEM organism still poses mysteries almost 2 years after it was first manifested (but not identified) among Irish breeding stock in 1976. In March of last year, trouble became apparent at the English National Stud in Newmarket, when the mares mated to the six stallions there repeatedly failed to conceive. Efforts to culture the organism persistently failed until May when the agent was isolated at a public health laboratory that studies human venereal diseases. There it was discovered that the bacterium, like the human gonococcus, is anaerobic—

Photo by John Noye

Mares and foals on Calumet Farm in early spring.

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Engineering Academy Elects Members

The National Academy of Engineering last month elected 100 new members and 19 new foreign associates, whose names follow:

Frederick W. Albaugh, consultant, Richland, Washington; **William D. Alexander**, Metropolitan Atlanta Rapid Transit Authority; **Lew Allen, Jr.**, U.S. Air Force, The Pentagon; **Neil Armstrong**, University of Cincinnati; **Robert Avery**, Argonne National Laboratory; **Hannskarl Bandel**, Severud-Perrone-Sturm-Bandel; **Melvin L. Baron**, Weidlinger Associates; **Hans H. Bleich**, Columbia University; **Bruce A. Bolt**, University of California, Berkeley; **Richard H. Bolt**, Bolt, Beranek and Newman, Inc.; **Francis W. Boulger**, Battelle Columbus Laboratories; **Harry E. Bovay, Jr.**, Bovay Engineers, Inc.; **Raymond F. Boyer**, Midland Macromolecular Institute; **David Brown**, Halcon International, Inc.; **G. Edwin Burks**, Peoria, Illinois; **Lloyd S. Cluff**, Woodward-Clyde Consultants; **Robert L. Coble**, Massachusetts Institute of Technology; **Charles Concordia**, Venice, Florida; **Andrew F. Corry**, Boston Edison Company; **Harvey G. Cragon**, Texas Instruments, Inc.; **Leo S. Crane**, Southern Railway Company; **Georges A. Deschamps**, University of Illinois, Urbana.

Raymond L. Dickeman, Exxon Nuclear Company, Inc.; **Rex A. Elder**, Bechtel Corporation; **Von R. Eshleman**, Stanford University; **Harold Etherington**, consultant, Jupiter, Florida; **David C. Evans**, Evans and Sutherland Computer Corporation; **Thomas E. Everhart**, University of California, Berkeley; **James L. Flanagan**, Bell Laboratories; **J. Earl Frazier**, Frazier-Simplex, Inc.; **Richard L. Garwin**, IBM Thomas J. Watson Research Center; **Robert F. Gilkeson**, Philadelphia Electric Company; **Eric T. B. Gross**, Rensselaer Polytechnic Institute; **William T. Hamilton**, Boeing Aerospace Company; **George N. Hatsopoulos**, Thermo Electron Corporation; **Robert C. Herman**, General Motors Research Laboratories; **Beatrice A. Hicks**, consultant, Dover, New Jersey; **David C. Hogg**, National Oceanic and Atmospheric Administration; **Charles L. Hosler, Jr.**, The Pennsylvania State University; **Herbert E. Hudson, Jr.**, Water & Air Research, Inc.; **George W. Jeffs**, Rockwell International Corporation; **Herbert H. Kellogg**, Columbia University.

Jack L. Kerrebrock, Massachusetts Institute of Technology; **Herbert J. C. Kouts**, Brookhaven National Laboratory; **Rolf W. Landauer**, IBM Thomas J. Watson Research Center; **William W. Lang**, IBM Corporation; **Thurston E. Larson**, Illinois State Water Survey; **Joel M. Leathers**, the Dow Chemical Company; **William S. Lee**, Duke Power Company; **William J. LeMessurier**, Sippican Consultants International, Inc.; **Ludwig F. Lischer**, Commonwealth Edison Company; **John R. Low, Jr.**, Charlotte, North Carolina; **William R. Lucas**, National Aeronautics and Space Administration; **Robert W. Lucky**, Bell Laboratories; **Herbert G. MacPherson**, consultant, Oak Ridge, Tennessee; **Nathan Marcuvitz**, Polytechnic Institute of New York; **Walter G. May**, Exxon Research and Engineering Company; **James D. Meindl**, Stanford University; **Russell G. Meyerand, Jr.**, United Technologies Research Center; **Harold S. Mickley**, Stauffer Chemical Company; **Dade W. Moeller**, Harvard University; **John R. Moore**, Actron; **William W. Moore**, Dames & Moore.

James J. Morgan, California Institute of Technology; **Walter E. Morrow, Jr.**, Massachusetts Institute of Technology; **William H. Mueser**, Bedford Village, New York; **Donald J. O'Connor**, Manhattan College; **Antoni K. Oppenheim**, University of California, Berkeley; **Simon Ostrach**, Case Western Reserve University; **Herbert M. Parker**, HMP Associates, Inc.; **C. Kumar N. Patel**, Bell Laboratories; **Harold W. Paxton**, United States Steel Corporation; **Harold A. Peterson**, Green Valley, Arizona; **James W. Plummer**, Lockheed Missiles and Space Company, Inc.; **Fred H. Poettmann**, Marathon Oil Company; **Nathan E. Promisel**, consultant, Silver Spring, Maryland; **John A. Quinn**, University of Pennsylvania; **George A. Roberts**, Teledyne, Inc.; **Lawrence G. Roberts**, Telenet Communications Corporation; **Kenneth A. Roe**, Burns and Roe Inc.; **Anatol Roshko**, California Institute of Technology; **Dale F. Rudd**, University of Wisconsin, Madison; **Alfred Saffer**, Oxirane International; **Roland W. Schmitt**, General Electric Research and Development Center.

Alexander C. Scordelis, University of California, Berkeley; **L. E. Scriven**, University of Minnesota; **Ralph A. Seban**, University of California, Berkeley; **Masanobu Shinozuka**, Columbia University; **Lawrence H. Skromme**, Sperry-New Holland; **Roger W. Staehle**, Ohio State University; **John E. Steiner**, The Boeing Company; **Robert E. Stewart**, Texas A&M University; **George W. Swenson, Jr.**, University of Illinois, Urbana-Champaign; **Peter Swerling**, Technology Service Corporation; **Bruno Thürlimann**, Swiss Federal Institute of Technology; **Aldert van der Ziel**, University of Minnesota, Minneapolis; **Ivan M. Viest**, Bethlehem Steel Corporation; **Andrew J. Viterbi**, Linkabit Corporation; **James Wei**, Massachusetts Institute of Technology; **Kenneth T. Whitby**, University of Minnesota, Minneapolis.

Foreign associates: **Egil Abrahamsen**, Oslo, Norway; **Yoshio Ando**, Bunkyo-Ku, Japan; **Peter V. Danckwerts**, Cambridge, England; **Duncan S. Davies**, London, England; **Satish Dhawan**, Bangalore, India; **John B. Gunn**, (England); **Tamaki Ipponmatsu**, Tokyo, Japan; **Jerwig W. Kogelnik**, (Austria); **Hendrik Kramers**, Arnhem, The Netherlands; **Charles E. Massonnet**, Liege, Belgium; **Ian McLennan**, Melbourne, Australia; **Koyoshi Muto**, Tokyo, Japan; **Pyoter S. Neporozhny**, Moscow, U.S.S.R.; **Marc J. Pelegrin**, Toulouse, France; **Rudolf Schulten**, Aachen, Federal Republic of Germany; **H. E. D. Scovil**, (Canada); **Harold A. Smith**, Ontario, Canada; **Georges A. C. Vendryes**, Paris, France; **Leonardo Zeevaert**, Mexico City, Mexico.

that is, it wouldn't grow when cultured with oxygen—which is why prior testing had yielded negative results. By then, the National Stud had been closed for the rest of the breeding season along with other stud farms in the Newmarket area, with a resulting loss of $30 million (including stud fees and future sales). The disease caused fertility to drop from 72 to 42 percent.

Thoroughbreds are the jet-setters of the animal world. Horses are constantly being flown hither and thither to be raced, sold, and bred. It is therefore difficult to pinpoint the origin of CEM. Some of the 150 mares in the National Stud had been in six countries within the year prior to their residence in Newmarket. Some suspect that the bacteria is a recent mutation. Swerczek of the Kentucky lab believes it more likely that the infection has been smoldering in a small population of horses and that with increased traffic it finally spread.

USDA veterinarians spent a good deal of time investigating the situation in Europe last year; as a result of their findings, this country put a ban on imports of all horses from England, Ireland, and France, where CEM has also appeared. The ban was subsequently extended to Australia but loosened to allow imports of weanlings, yearlings, and horses coming over to race. In the meantime the USDA also inaugurated a program to test all the breeding stock (about 200 horses) imported from the four countries between the time the disease was first discovered and the 9 September ban.

Nonetheless, CEM slipped through, and suspicion has centered on two French thoroughbreds, Caro and Lyphard, who were flown to Kentucky just before the ban. (Brownell Combs, owner of Spendthrift Farm, chartered a plane to get Caro over which took off 2 hours before the ban went into effect.)

The French, who have been notably closed-mouthed about CEM in their country, reportedly gave the horses a clean bill of health. They were further tested on arrival, with cultures sent to USDA's Plumb Island Laboratory in New York. Caro was reportedly tested 11 times, all with negative results. It is now suspected that either culturing techniques had not yet been perfected or the bacteria died en route to the lab, because in early March, two mares to which Caro had been bred showed symptoms (profuse vaginal discharge) of CEM. From then on things moved fast. The UK lab tested cultures from the mare and found them postive on 8 March. Two days later Gainesway Farm announced suspension of breeding. On 12 March came con-

firmation of the UK test results from Plumb Island. On 14 March commissioner Harris set up a 28-member "horse advisory committee" composed of horse farmers and veterinarians, and established the 2-week breeding moratorium. He also established a 1-month ban on the movement of any horses out of the state. Shortly afterward Texas and California imposed bans on the import of horses from Kentucky, and two other major thoroughbred states, Virginia and Florida, were considering similar action.

The situation may have reached the height of confusion at a meeting held on 16 March at Keeneland racetrack in Lexington, attended by some 1200 horse people, where state officials and the English veterinarians tried to explain the situation to them. The moratorium laid bare divisions within the industry, leaving it, in the words of one veterinarian, "vindictive and fragmented." One anguished breeder is reported as saying, "This is the worst thing that has happened in my lifetime."

There are basically two kinds of thoroughbred breeding farms in Kentucky—several hundred that board only mares and have to transport them to be bred (this is "walk-in" breeding which accounts for half the foal production); and large stud farms where breeding can be carried on in-house. Since the moratorium did not prohibit breeding at the latter, the smaller horse farmers were furious at what they saw as an unfair advantage for the big farms like Gainesway (owner of the infected stallion Lyphard), Spendthrift, Calumet, and Claiborne. Some were inclined to blame the whole business on Spendthrift's Brownell Combs, who didn't help matters by saying some of the other breeders were "acting like snakes." There was even discussion of lawsuits. Even with breeding halted for only 2 weeks they foresaw a shortfall or at least a late crop of foals next year. Breeders want their foals to drop as soon after the first of the year as possible. All foals become 1 year old on 1 January; the older a yearling is at the summer sales the higher the price it is likely to fetch.

Now, however, the clamor appears to have subsided as the breeders get back to business. Barring new cases of CEM, they may be able to make up for lost time by extending the breeding season, which usually goes from mid-February to mid-June, into July. But there is no complacency in Kentucky this year. The horse barns, which are ordinarily clean enough to have a picnic in, are being subjected to ever-higher levels of hygiene. Teasing horses—used to test the receptivity of a mare in estrus so she won't kick when mounted by a million-dollar stallion—are no longer allowed to touch the mares. Plastic-lined buckets, disposable equipment, and Latex obstetrical sleeves are now used by handlers attending to breeding operations.

The state, on 28 March, has issued a detailed Code of Practice for testing all animals that could possibly be suspect, and the agriculture office has produced a videotape for veterinarians showing in great detail how to take samples for culture and how to administer various antiseptics, ointments, and antibiotics. The veterinarian in the film advises, for example, that two grooms be involved in cleaning the stallion's penis—one for each end (for the cleaning procedure the stallion must be in full erection, which is achieved by having a mare in heat standing by). A suspect stallion is only certified clean after three sets of cultures, taken 7 days apart, have been found to be negative. Mares, who can only be cultured in estrus (every 18 to 21 days), are pretty much knocked out for the season if they test positive.

Artificial Insemination

All the testing, quarantining, and reporting procedures in the Code of Practice—which are of as intense concern to breeders as recombinant DNA guidelines are to biomedical researchers—are likely to be willingly followed by breeders. But an executive order issued by the Governor the same day raised another bout of controversy. That order made the use of artificial insemination (AI) mandatory with any stallion standing on a farm where there is an "infected, exposed, or suspicious" horse, and with any infected, exposed, or suspicious mare. (There has been no evidence of metritis bacteria in the semen itself.) Such procedures were to commence on 4 April under guidelines established by the Jockey Club in New York, which is the organization that registers all American thoroughbreds. Or if the Jockey Club didn't go along with the idea, procedures would be established by the Kentucky Department of Agriculture.

Only 14 farms would have to go the AI route, and Harris emphasized in a statement that it would only be a temporary measure, for the rest of this season. But to thoroughbred breeders the idea is abhorrent. Standardbreds (trotting horses) have a venerable AI tradition, with some stallions having a book of several hundred mares a season. Thoroughbreds are the princes of equines, with all lineage traced back to three stallions born in the mid-18th century. Nowhere in the world has AI been permitted with the breed, and rules of the American Stud Book, which is owned by the Jockey Club, specifically require "natural service" of mares if a foal is to be eligible for registration as a thoroughbred. Rules allow for "immediate reinforcement," which means infusion of a portion of the ejaculate by handlers, but AI—definitely not. "Some will find it sacrilegious," noted Harris. Tradition aside, AI could make it possible for a Secretariat (the Triple-Crown winner in 1973) to sire thousands of foals, thus bringing down stud fees and skewing bloodlines (the average stallion covers about 40 mares a season).

"At the bottom line, it comes down to three choices," says a Kentucky agriculture official: breed and risk spread of CEM, not to mention having the whole of Kentucky put in quarantine by the rest of the world; don't breed at all until the disease has been eradicated; or use AI. The policy has been confirmed by USDA, whose secretary, Bob Bergland, sent Kentucky a telegram saying AI was "imperative if we are to prevent the spread of CEM."

If AI were practiced, precautions would be elaborate. Harris was lining up 25 people to serve as witnesses for the procedures. Among strictures under discussion were collection of semen and infusion of the mare while the two horses are in each other's presence, a rule against using semen for more than one mare, and blood typing of mare, sire, and foal for proof of paternity. But even if it is only permitted for a limited time, there is the feeling that if AI gets its foot in the door, as one Irish groom said worriedly, "we can never turn back the tide."

Just before *Science* went to press, however, it appeared a crisis over AI has been averted. The Jockey Club's board of stewards met for 4 hours on 3 April and unanimously and emphatically rejected any change in the rules that would permit the use of AI. At the same time, the state agriculture department relaxed its ruling on AI, which now would not be mandatory on farms where CEM is suspected. This means the procedure will be used very little, if at all, because AI-bred foals could not be registered as thoroughbreds and would thus be valueless for racing and breeding. The USDA meanwhile took steps to ensure that CEM remains confined to Kentucky by putting an open-ended quarantine on movement of breeding stock out of the state. Mares are still being allowed to come to Kentucky to be bred so long as they are willing to stay for a while until certified clean of the disease.

The CEM story has been widely pub-

licized, but mostly on the sports pages. It could just as well have been the financial pages. Studs command fees ranging from $500 to $50,000. Top racehorses are generally syndicated when they retire to stud, with shares (around 40, corresponding with the number of foals they sire in a season) going for up to $250,000 apiece. "Breeding is like the stock-market," says one Lexington horse farmer. "Everyone is trying to look into a crystal ball to see what sire will be most popular 2 years away so you can have a valuable yearling. The horse business is more nerve-wracking than the commodities market."

There is a good deal of irony in the fact that a homely social disease has struck in the world center for thoroughbreds. Says one horseman, "you never feel it can happen to you."—CONSTANCE HOLDEN

Sun Day Seen as More Potent Politically than Earth Day

Sun Day, the "celebration of the sun" and solar technology that will be held on Wednesday, 3 May, is regarded by its sponsors as an even more politically significant event than was its forebear of 8 years ago, Earth Day, which is widely believed to have helped the then nascent environmental movement become a powerful force.

Although the Sun Day staff of about 26 paid organizers is based in Washington, some are at work in every region of the country and a network of from 300 to 400 local and regional coordinators and organizers is being developed. Sun Day observances—such as solar fairs and conferences, "Sun dances," sunrise celebrations, and sidewalk rallies and demonstrations—have been planned in all 50 states and in at least 150 major cities, according to Denis Hayes, chairman of the Sun Day board of directors. "This looks like it's going to be gigantic," says Hayes, who was also national coordinator for Earth Day.

Congress has adopted a resolution heralding the observance, and President Jimmy Carter—although his Administration is accused of footdragging on solar development—has issued a proclamation calling on all Americans to recognize Sun Day with "appropriate activities and ceremonies." The Department of Energy (DOE), the Department of Housing and Urban Development, and some other federal agencies will join in the observance by providing speakers and educational materials, operating "Sun Dial" information centers for persons to call toll free, conducting solar workshops, mounting exhibits, and so on.

Secretary of Energy James R. Schlesinger and numerous other officials are expected to speak at Sun Day events, and it now appears that a new solar initiative will be announced by the President himself. According to Jim Bishop, DOE's director of information, the President may announce that Congress will be asked to require that all new housing eligible for Federal Housing Administration financing be designed to include "passive" solar features and systems. Homes so designed capture the heat of the winter sun by features such as double- or triple-glazed windows which face to the south and have been shown to reduce fuel requirements for home heating by as much as 75 percent.

Its spokesmen say that Sun Day has two main goals. One is to inform the public that solar energy is not remote and exotic, but something that is here and now and promising to become increasingly competitive with other forms of energy. The other goal is to build a broad and effective coalition to push politically for rapid development of solar energy.

Sun Day symbolizes a faith that is intended to be free and spacious enough to accommodate people of highly diverse beliefs and motivations. Many of its subscribers belong to the antinuclear movement and see solar technology as an inexhaustible source of clean energy that lends itself to decentralized applications of modest scale. Denis Hayes himself falls in this category. But many are not antinukes—some are simply business people or labor unionists or community organizers who are interested in profits or jobs. Others are consumerists who are concerned about the rising costs of conventional fuels.

The 36-member Sun Day board includes people as diverse as Sheldon Butt of the Solar Energy Industries Association; Hazel Henderson, the futurist; Alan McCowan of the Scientists' Institute for Public Information; Jeremy Stone of the Federation of American Scientists; Douglas Fraser, Edward J. Carlough, and William Winpisinger of the United Auto Workers, the Sheet Metal Workers, and the International Association of Machinists, respectively; Kathleen O'Reilly of the Consumers Federation of America; Thomas Bradley, Los Angeles' black mayor; the Reverend Lucius Walk-

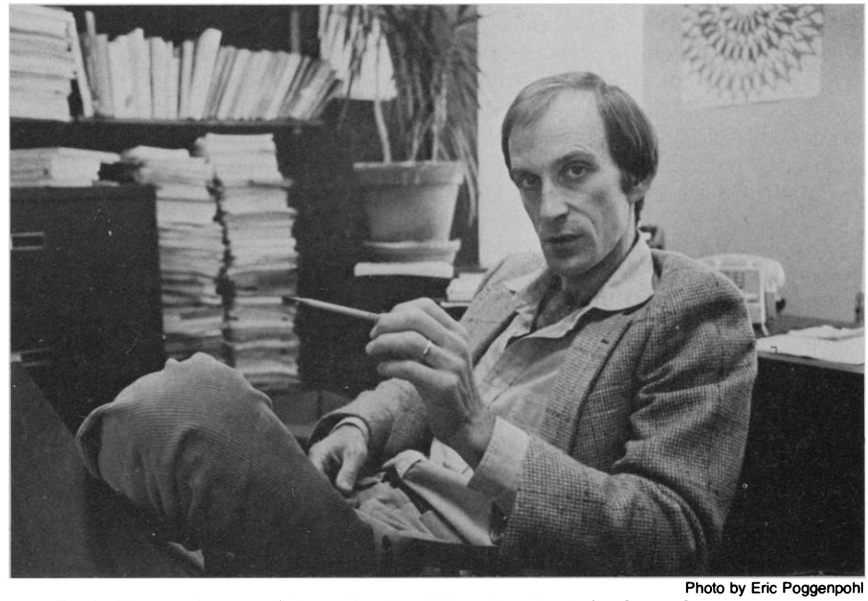

Photo by Eric Poggenpohl

Denis Hayes, director of Earth Day in 1970, is Sun Day's leader and prime mover.

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