ABSTRACT
Database searching for research involving warm-blooded animals is required by law in the United States and is also a requirement for performing animal research in many other countries. It is, therefore, necessary for the investigator/researcher to perform a reasonable database search before developing the research protocol.

Key Words: Databases, Searching, Websites, Animal models, Resources, Strategy, Protocol, Animal, Area of Study, Sources of Information.

INTRODUCTION
The United States (U.S.) Animal Welfare Act,1 U.S. Department of Agriculture (USDA) animal welfare regulations,2 and USDA-Animal Care Policy 123 require that the principal investigator, using warm-blooded animals in research, must ensure that pain and distress are minimized, that alternatives to the proposed procedure or protocol are not available, or if alternatives are available why they were not used, and that the research does not unnecessarily duplicate previous experiments. Also, many countries now have regulations that require researchers to document that they have conducted a search for possible alternatives when applying for permission to conduct animal research.

Database searching is the best method to find animal resources and to comply with the requirements of the Animal Welfare Act or similar regulations. It is important to become familiar with the database platform, the subjects covered in each database, and the sources of information for each database to perform an effective and reasonable search effort. An institution’s librarian or information specialist can be of considerable help with database searching and should be consulted prior to developing the research protocol. Training of researchers in how to perform a proper database search is also recommended as the search strategy determines the type and quality of the information obtained.

DATABASES
While there are many papers discussing the utility of various bibliographic and specialty databases and information centers in the development of animal research protocols,4–18 it is still useful to point out major providers/suppliers/repositories of animal models for biomedical research.

In the United States, the National Institutes of Health (NIH) is the primary resource for the development and funding of biomedical animal models. Their website—Model Organisms for Biomedical Research (http://www.nih.gov/science/models)—is a good starting point for information on various projects under development by the NIH, its grantees, and other national and international laboratories. Among the organisms listed are mammalian models, especially rat and transgenic mouse models, yeast, fungi, round worm, fruit fly, and frogs. Another excellent resource is the NIH, National Center for Research Resources, Division for Comparative Medicine. (http://www.ncrr.nih.gov/comparative_med.asp). The Division for Comparative Medicine provides access to laboratory-bred nonhuman primates including macaques, baboons, chimpanzees, owl monkeys, squirrel monkeys, and others. The Division also maintains an aquatic animal models program (zebrafish, Xiphophorus, cephalopods, and Aplysia) and has initiatives for invertebrates (Drosophila, Caenorhabditis, Aplysia, Tetrahymena, and cephalopods). The Institute for Laboratory Animal Research at the U.S. National Academies of Science has a unique search engine available that searches the websites of suppliers and repositories that sell or distribute experimental animals. It is available at http://dels.nas.edu/ilar_n/ilarhome/models.shtml.

The European Union (EU) maintains the European Mouse Mutant Archive (EMMA) (http://www.emma.rm.cnr.it/), which preserves and distributes relevant strains collected from repositories and laboratories throughout the EU. The EMMA Strain Database is accessible through an easy to use search utility and can be found at http://andy.emma.cnr.it/jEmma/list.utf8.html. In Japan, the Riken Bioresource Center was established by the government to serve as a global resource for biomaterials. The Center serves as the Japanese repository for an extensive collection of mouse strains. The searchable catalog provides a detailed description of the model, strain information, the developer, and pertinent journal references. The English version is available at http://www.brc.riken.jp/lab/animal/en/. Another excellent inter-
national source of information on animal models and their availability is through the Federation of International Mouse Resources (FIMRe). This 11 nation collaboration provides researchers with access to a searchable mutant mouse catalog, searchable database of mouse genome informatics, nomenclature guidelines, and links to repository sites for contributing new strains. It is available at http://www.fi mre.org. These websites also provide numerous links to university collections, national laboratories, and commercial vendors.

Not surprisingly, commercial vendors also maintain extensive databases of useful animal models. The Jackson Laboratory (http://www.jax.org), which operates as a nonprofit institution, is one of the world’s foremost repositories for unique mouse models and maintains a searchable database of available strains. This database, the International Mouse Strain Resource, contains information on global stocks of inbred, mutant, and engineered mice. It can be found at http://www.informatics.jax.org/imsr/index.jsp. Charles River Laboratories (http://www.criver.com) is a commercial vendor of rodents, rabbits, chickens, and chicken eggs. It maintains a database of disease models and transgenic models and provides access to the Deltagen repository of 900 knockout mouse lines. Taconic Farms (http://www.taconic.com), with its partner Lexicon Genetics, maintains a searchable database of genetically modified mice and has numerous other rodent models listed with detailed descriptions of their utility. Harlan (http://www.harlan.com) and Harlan Europe (http://www.harlaneurope.com), as the world’s largest suppliers of laboratory animals, provide information resources on a variety of animal models and maintain an extensive catalog of rats, mice, hamsters, guinea pigs, cotton rats, gerbils, and rabbits. More vendor information can be found at http://guide.labanimal.com and http://www.lal.org.uk/breedersandsupp1.html. Table 7–1 summarizes the information listed above.

Large bibliographic databases such as the National Library of Medicine’s Pubmed (http://www.pubmed.gov), Elsevier’s EmBase (http://www.embase.com), and Thomson Scientific’s BIOSIS (http://www.biosis.org) are catalogs of the world’s peer-reviewed scientific publishing. As such they contain a wealth of information on different animal models and provide background information on these models. It is important to remember that while there is some overlap in coverage, each database contains unique information not found in the others. Not only does subject coverage vary but the sources of information are varied as well. For example, a search of Medline should also include EmBase, which includes monographs, reports, and other useful sources not included in Medline, which covers only journals. Several core databases, such as Medline, EmBase, and Biosis, should be searched in order to conduct a comprehensive literature search. Elsevier has made this somewhat easier by combining their EmBase with unique records from Medline to create EmBase.com containing more than 17 million biological and pharmacological records. Choosing databases pertinent to the protocol will provide the researcher with better information and more accurate resources for the study and will better comply with the laws and regulations pertaining to animal research.

The following tables list selected bibliographic databases for animal resources (Table 7–2), the subjects covered (Table 7–3), and the sources of information for the selected databases (Table 7–4). Table 7–5 lists web addresses for database vendors or portals to a variety of online databases.