In its current form, I recommend it as a supplement for laboratories work in progress, and not all of the media and assays used. However, the Microbiology Laboratory is here; however, the order of some of the techniques used in an undergraduate microbiology laboratory are available. A number of microbiology photographic atlases are reviewed, as were two Demonstration Lab Manuals available for use with undergraduate students. They provide additional photographs and figures above and beyond the additional survey chapters on bacteria, archaea, microbial eukaryotes, and clinically relevant eukaryotes. Also, the chemical details are not extensive survey chapters on bacteria, archaea, microbial eukaryotes, and viruses. Even so, the chemical details are not extensive survey chapters on bacteria, archaea, microbial eukaryotes, and clinically relevant eukaryotes. The initial chapters do tie in well, though, with identification of unknown bacteria. I highly recommend this atlas as a comprehensive resource for all undergraduate microbiology students to refer to both in and out of the lab. The most comprehensive of all the print atlases reviewed. In addition to over 500 photos, detailed descriptions of each technique and media are accompanied by useful diagrams. However, the “Tips for Success” section provided for each technique. The use of online versus print resources is an ongoing debate, but as access to computers in the laboratory increases, the decision to go online rather than print is becoming increasingly common.

KITS AND LABORATORY RESOURCES

Using LabPaq Kits to Perform Science Labs at Home
DOI: 10.1128/jmbe.v12i2.335


LabPaqs are mail-order kits sold by Hands-On-Labs Inc. (http://www.labpaq.com/). They are primarily designed to provide laboratory experiences for students enrolled in online science courses. The kits include all non-household materials necessary to perform the experiments and a full color lab manual on CD. This review will focus on the Microbiology and Majors 1st semester Introductory Biology LabPaqs, used in courses with which this author is most familiar. Descriptions of the kits and activities on the website were reviewed, as were two Demonstration Lab Manuals provided by the company. The Microbiology LabPaq (MBK - $299) which requires access to a microscope with an oil immersion lens (available for $176) is described as being used with a “Full Semester, College Level Microbiology” course. Laboratory activities include observing various prepared slides, preparing and observing Gram stains and wet mounts, aseptic technique and streak plating, several fermentation tests, antibiotic sensitivity testing, a yeast experiment, an activity to explore transmission of microbes by fomites, and an environmental microbiology experiment.
BK-2A ($199), designed for “1st semester College Biology for Science Majors,” includes activities focusing on the scientific method, microscopy, cell structure and function, enzymes, photosynthesis and respiration, mitosis and meiosis, and Mendelian genetics.

Other custom Introductory Biology LabPaqs that appear to have been designed for/by specific institutions include activities related to DNA and protein synthesis, DNA isolation and molecular biology, short tandem repeat analysis, primate evolution, natural selection and more.

There is a very good safety video available on the website describing the types of potential hazards and appropriate precautions involved in using the LabPaqs. The lab manuals also contain detailed safety, preparation, and clean up information, as well as basic information on the metric system, statistics, data analysis with spreadsheets, and lab report forms.

In general, the LabPaqs appear to correspond to approximately half of the lab activities in a typical on-site course. The instructor could easily supplement the LabPaq to fill in gaps with online activities such as 3-D molecular modeling, bioinformatics/phylogenetic tree construction, or simulations. The fact that students must set up the experiments on their own, follow instructions carefully, pay attention to detail, and troubleshoot on their own promotes independence and critical thinking skills. On the other hand, the experimental limitations imposed by not having access to equipment, instruments, or supervision by a trained, experienced scientist prevent students from doing sophisticated experiments or obtaining hands-on experience with instruments such as pipettors, spectrophotometers, or electrophoresis units.

The strengths of the lab manuals are the introductory material on measurement, graphing, lab reports, and safety. The parts of the lab manuals specific to the different kits were written at a very basic level (high school at best), and frequently contained inaccuracies, oversimplifications, and statements that would be “deal breakers” for many educators. Specific examples include referring to “Evolutionists” and misusing the word “theory” in the following statements:

From the Cell structure lab, “Evolutionists think that eukaryotes developed from prokaryotic cells after conditions became favorable for their existence.”

From the Lab report guidelines, “What is the theory or model behind the experiment performed(sic)? Do the experimental results substantiate or refute the theory? Why?”

These types of statements, along with countless other inaccuracies such as showing the amino acid leucine as an example of a protein, suggest that students following the manual and learning exactly what is contained therein may be worse off than those who have no lab with their online course.

Given that online courses are not going away, the concept of “at home labs” is worthy of exploration. The LabPaq lab manuals would require major peer review and an expansion of the technical sophistication of the activities before they could be considered equivalent to a college-level laboratory course.

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