2002/2003 MSPPSA SERIES

MICROPLATE READER & EQUIPMENT MARKET

AN ANALYSIS OF MARKET SIZE & GROWTH
MARKET SHARE
PURCHASE PLANS &
SUPPLIER ASSESSMENT FOR
THE U.S. LIFE SCIENCE RESEARCH MARKET

A Multi-Client Report

by
PhorTech International
San Carlos, California

August 22, 2002

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I. Background

A. SURVEY OBJECTIVES

The purpose of this survey was to provide the management of our client companies with an analysis of the current market for microplate readers, counters and related equipment in the U.S. This will focus on the attitudes and expectations of researchers who are currently using, or have access to microplate equipment.

The survey was Web-based, at a location on our Web site made known to respondents through an email invitation. The surveying was blind, with no reference made to any of our clients. To encourage respondents to express themselves freely, the survey was anonymous, and made frequent use of open-ended questions.

Two demographic screens were used to characterize respondents, the type of organization and the respondent's scientific discipline.

Early on the in survey, respondents were asked whether or not they currently use or have access to a microplate reader or counter. Respondents answering negatively were directed to back out of the survey as they were not qualified to continue. Respondents answering positively were asked to provide detailed audit information for all microplate readers and counters purchased in the last three years. In particular, respondents were asked to provide the brand and model, year of acquisition, cost for each instrument, and mode(s) of detection from a list of six choices. These options include absorbance, fluorescence intensity, fluorescence polarization, time resolved fluorescence, luminescence and radioisotopic. Respondents were then asked to describe the reasons for choosing the most recent model.

Next, respondents were queried as to whether they would make the same decision again if they were purchasing an instrument today. If not, they were asked to identify the brand and/or model which they would purchase at this time and to explain the reasoning behind their response.

In order to ascertain current methodologies using microplate instrumentation, the next series of questions deals with the respondent's monthly throughput. First, respondents are asked to identify the number of 96-well, 384-well and 1536-well plates used on a monthly basis for the six detection methods listed in the audit: absorbance, fluorescence intensity, fluorescence polarization, time resolved fluorescence, luminescence and radioisotopic. Respondents are also asked to quantify the number of plates used per month for each of the following seven applications: nucleic acid/protein quantitation, cytotoxicity/proliferation, enzyme assays & inhibitors, microbial growth, endotoxin/LAL, ELISA/other absorbance, reporter gene assays, or an eighth choice for unlisted applications. Relating to the usage of the most recent model of microplate reader, the next query asks

what percentage of usage is devoted to five areas: research, high throughput screening, assay development, quality assurance or an other area.

The next question was an open-ended probe requesting suggestions for improvements or new features for microplate readers, counters or related equipment. This was followed by a ranking question in which respondents rate nine major microplate equipment manufacturers (and an other category) according to seven criteria. Specifically, respondents rate manufacturers regarding ease of use, versatility, reliable quality, degree of innovation, value for money, field service and commitment to microplate analysis.

The next questions dealt with plans for purchasing microplate equipment within the next 12 months, identifying whether this was anticipated to be a dedicated instrument for absorbance, fluorescence, or luminescence, or a multimode instrument. For those considering a reader with more than one detection mode, respondents were asked to indicate which of five modes of detection would be required. They were also asked to explain the reasoning behind their decision and to provide instruments and manufacturers which would be considered.

This was followed by a series of questions regarding respondents' use of automation. To establish the level of automation currently in use, respondents were asked to identify which of the five steps in the process (pipetting, dispensing, washing, incubating and reading) are automated, whether an automated transfer of microplates occurs, and if so, to indicate where in the process the transfer(s) occurs.

Finally, respondents were asked to itemize all automated microplate process instrumentation providing the brand, model, year acquired, and cost per instrument. They were also asked to identify which step was automated from a list of five options. These include auto-pipetting, auto-dispensing, washing, incubating or plate transfer.

Major objectives of this survey were to determine the present market size and share for leading microplate reader and automated process instrument manufacturers in the U.S. We will also examine the frequency of use for the standard 96-well plate, as opposed to the 384 and 1536-well sizes, the most frequently used applications and common areas of work. In addition, the level of automation currently in use will be examined, along with plans for future purchases and a measure of customer satisfaction for manufacturers serving this market sector.

B. SURVEY METHODOLOGY

E-mail invitations to take part in the survey were sent to a selected cross-section of our panel of 5,000 life science researchers worldwide. After selection for appropriate areas of interest and to screen out competitors, invitations were sent to 2,036 U.S. members of the panel who have been in contact with us in the last year. Customized email invitations to the web-based survey were sent on March 14th to 1,000 researchers with subsequent groups of approximately 500 invitations sent on March 15thand 19th. These were supplemented with invitations to a further 401 researchers from an earlier portion of the list on March 26th.

There were 103 email messages returned as undeliverable from the first three mailings of the PhorTech panel, corresponding to a rate of 5.1%. The older panel list resulted in 87 undeliverables, for a much higher rate of 21.8%. By deducting the 190 undeliverables from the 2,437 outbound invitations, we calculate that a total of 2,247 life science researchers received invitations to participate in the survey.

The questionnaires were anonymous, using a combination of tabular entry, check-offs, and open-ended probes. However, almost all respondents did identify themselves by filling in the prize entry form. This makes it possible for us to double-check the responses to any questions by telephoning respondents, improving the overall confidence in the data. We did not observe any survey fatigue in this questionnaire, and felt that respondents spent considerable time explaining their positions on the open-ended questions.

With a current total of 424 responses from the 2,247 invitations, the overall response rate is 18.9%, which met expectations. The overall statistical results that will be presented in the final report will be accurate to within ±4.7 percentage points at the 95% confidence level.

In our experience, 95% confidence levels are appropriate primarily for scientific experiments. Most business people making decisions are content to be right more often than they are wrong. In this case, a 65% confidence level, (in which you would be right twice as often as you would be wrong) is more appropriate. Conveniently, 65% confidence levels are nearly exactly one half the size of the 95% level, thus our 65% levels would be ±2.4% for all respondents.

According to the binomial distribution theory, these values are valid when the measured event has about a 50% probability. When the measured event is considerably more rare than this, the corresponding confidence intervals get smaller. On the other hand, these confidence intervals are valid for answers based upon the complete pool of respondents. When analyzing data for a

group that includes only a small segment of respondents, the answers are less certain and confidence intervals are correspondingly larger.

In this report, we will calculate more exact individual confidence intervals when appropriate. In our comments, we will note whether given differences are significant at either the 65% or 95% level. To aid our client in determining the appropriate confidence interval for various combinations of sample size and measurements, we have created the following table. Just read the closest percentage on the left and find the closest sample size column. The intersection will show the confidence interval for that combination. For example, a measured 35% value with a sample size of 200 has a 95% confidence interval of ± 6.6%.

95% Confidence Intervals for Various Percentages & Sample Sizes

Percent	n=10	n=20	n=50	n=100	n=200	n=500	n=1000
5%	±13.5%	±9.6%	±6.0%	±4.3%	±3.0%	±1.9%	±1.4%
10%	±18.6%	±13.1%	±8.3%	±5.9%	±4.2%	±2.6%	±1.9%
20%	±24.8%	±17.5%	±11.1%	±7.8%	±5.5%	±3.5%	±2.5%
35%	±29.6%	±20.9%	±13.2%	±9.3%	±6.6%	±4.2%	±3.0%
50%	±31.0%	±21.9%	±13.9%	±9.8%	±6.9%	±4.4%	±3.1%
65%	±29.6%	±20.9%	±13.2%	±9.3%	±6.6%	±4.2%	±3.0%
80%	±24.8%	±17.5%	±11.1%	±7.8%	±5.5%	±3.5%	±2.5%
90%	±18.6%	±13.1%	±8.3%	±5.9%	±4.2%	±2.6%	±1.9%
95%	±13.5%	±9.6%	±6.0%	±4.3%	±3.0%	±1.9%	±1.4%

II. Demographic Segmentation

QUESTION 20.

Question:

How would you best describe your organization?: academia, government agency, hospital/medical school, industry or private research foundation.

Rationale:

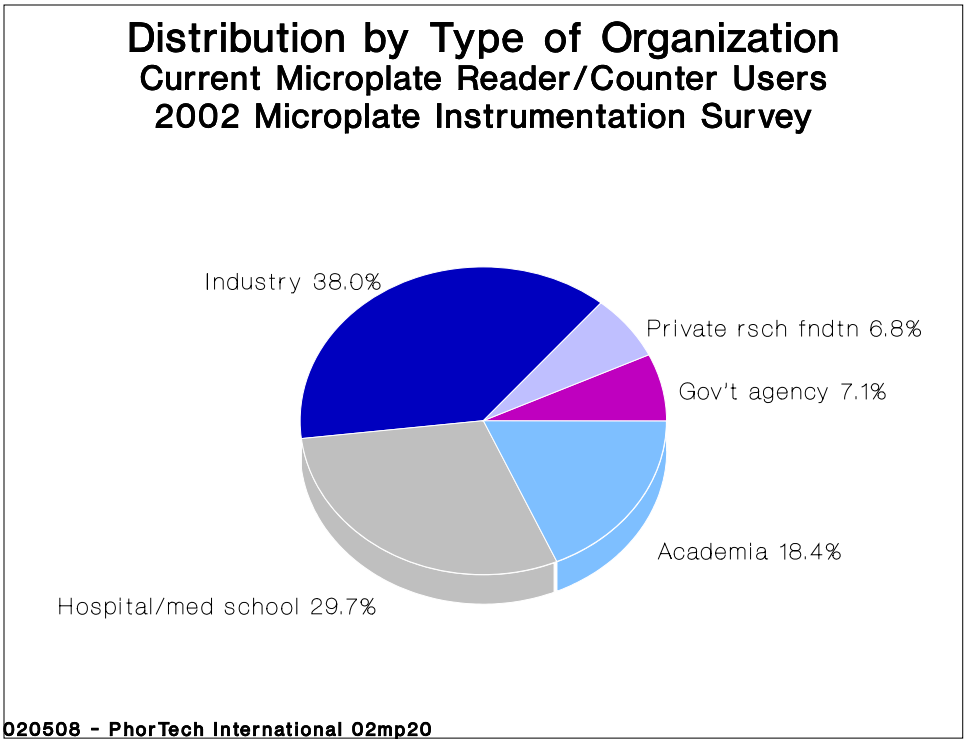
This screening question identifies the location of respondents using microplate equipment, allowing us to examine the instruments' relative prevalence in the five types of organizations.

Results:

The data was edited for consistency before analysis. This primarily consisted of grouping all respondents working in a hospital or medical school together in a single category. In addition, organizations whose major source of funding is private, or in cases where the suffix on the email address is .org, the organization is considered to be a private research foundation. Respondents with email addresses ending in .gov or .mil are defined as government agencies.

The distribution of these five types of organizations is depicted in a pie chart located at the top of the next page. The largest proportion, near 40%, are working in an industrial setting with an additional 30% working in either a hospital or medical school laboratory. These two types of organizations account for fully 70% of the 424 respondents to this survey. Just over 18% are located in academia with the remaining two sectors, government agencies and private research foundations combined accounting for just 14%.

This concentration of industrial researchers is consistent with previous studies in this area, but quite different from the distribution noted in surveys covering other areas of life science research. For example, the response base to comparable studies regarding instrumentation for DNA sequencing, amplification, or electrophoresis, to name a few, are typically comprised of a much larger proportion of academics, approximating 40%. Researchers from hospitals or medical schools traditionally account for about 25% of users with between 15% and 20% working in industry.



Analysis:

General trends in the microplate market can be seen by comparing these results with those from our 1995/96 study of the U.S. microplate market. We see a 50% drop in the proportion of respondents located in academia from 40% to the current 18%. This is compensated by 10% increase in the proportion of respondents working in hospitals or medical schools and a near 16% rise in the percentage from industrial settings.

For completeness, we present a list of the organizations represented by the respondents to this survey. These are grouped by type of organization which are then listed in descending order with the sector with the largest representation, industry, presented first.

Organizations Represented by Respondents to This Survey, by Type

Industry
Abbott Laboratories, Abbott Park
Abbott Laboratories, Gurnee
Affinity BioReagents, Inc.
Alkermes, Inc.
Allergan, Inc.
Ambergen
Amersham Biosciences
Angiogenix, Inc.
Applied Biosystems, Foster City
Applied Biosystems, Bedford
Bayer Corporation

BD Diagnostic Systems
Berkeley HeartLab, Inc.
Bio-Tek Instruments
Biogen
Biological Systems
Biomarin Pharmaceutical, Inc.
Bristol-Myers Squibb
Cel-Sci Corporation
Celera Genomics
Cell Pathways, Inc.
Cellomics, Inc.
Charles River Labs
Chiron Corporation
Clingenix, Inc.
Clontech Laboratories
Colgate-Palmolive
Cubist Pharmaceuticals
diaDexus
Diamond V Mills
Double Helix Derby Farm
Dow AgroSciences LLC
DuPont Central R&D
DuPont Experimental Station
E & J Gallo Winery
Elan Pharmaceuticals
Eli Lilly & Company, Indianapolis
Eli Lilly & Company, Greenfield
Enzo Life Sciences
Epimmune
Fibrogen
GelTex Pharmaceuticals
Gen-Probe, Inc.
Genentech
Genetics Institute, Cambridge
Genetics Institute/Wyeth, Andover
Genzyme Corporation
Genzyme Transgenics Corporation
GlaxoSmithKline
Gruenethal GmbH
Hawaii Biotech, Inc.
Hoffmann-La Roche, Inc.
Human Genome Sciences
Hy-Line International
Hybritech Beckman Coulter
Hyseq
ICN Biomedicals
Idun Pharmaceuticals
Immunex Corporation
Incyte Genomics
Invitrogen

Johnson & Johnson PRD
La Jolla Pharmaceutical Company
Lilly Research Laboratories
MedImmune, Inc.
Merck Research Laboratories
MetaMorphix, Inc.
Molecular Probes, Inc.
Monsanto, Chesterfield
Monsanto, Kirkwood
Monsanto, St. Louis
Nalge Nunc International
NECi
NeoRx Corporation
Neurochem, Inc.
NitroMed, Inc.
One Lambda, Inc.
Ontogen Corporation
Oxford Biomedical Research, Inc.
Oxford Laboratories
Pfizer Global R&D, Groton
Pfizer Global R&D, Ann Arbor
Pfizer, Inc., Newport
Pharmacia Corporation, Skokie
Pharmacia Corporation, Kalamazoo
Pharmacia Corporation, Chesterfield
Pharmadigm
Pierce Chemical Company
PKI Life Sciences
Progenics Pharma, Inc.
Promega Corporation
QED Bioscience, Inc.
Rigel, Inc.
Roche Diagnostics
Roche Molecular Systems
RxKinetix, Inc.
Schering-Plough Research Institute
Sigma-Aldrich
Signal Pharmaceuticals
Signature Bioscience
SUGEN, Inc
Third Wave Technologies
Transmolecular, Inc.
Trinity Biotech USA
UCB Research, Inc.
Unigene Laboratories
Unisyn
Upstate Biotech
Versicor
VistaGen, Inc.
Wyeth Research, Andover

Wyeth Research, Cambridge
Wyeth Research, Wilmington
XOMA (US) LLC

Hospital/Medical School

Auburn University
Baylor College of Medicine
Beth Israel Deaconess Medical Center
Boston University Medical School
Case Western Reserve University
Children's Hospital of Philadelphia
Children's Hospital, Boston
Creighton University Medical School
Duke Medical School
Emory University
H Lee Moffitt Cancer Center & Research Institute
Harvard Medical School
Henry Ford Health System
Hershey Medical Center
HSPH/Harvard School of Public Health
Indiana University School of Medicine
Johns Hopkins University
Louisiana State University Health Sciences Center
Louisiana State University School of Veterinary Medicine
Marshall University School of Medicine
Medical College of Georgia
Medical College of Virginia
Medical University of South Carolina
Morehouse School of Medicine
New York University School of Medicine
Northwestern University Medical School
Ohio State University Medical Center
Oregon Health & Science University
Robart Research Institute
Saint Louis University
Seoul National University
Texas A&M University Health Science Center
Tulane University Medical School
University of Alabama/Medical School at Birmingham
University of Alberta
University of Arkansas for Medical Sciences
University of California, Los Angeles Medical Center
University of California, San Francisco Medical School
University of California Medical School, Irvine
University of California School of Medicine, Davis
University of California School of Medicine, Elk Grove
University of Colorado Medical School
University of Delaware Medical School
University of Florida Medical School
University of Hawaii Medical School

University of Kansas Medical Center
University of Kentucky College of Medicine
University of Louisville Medical Center
University of Massachusetts Medical School
University of Medicine & Dentistry of NJ
University of Miami Medical School
University of Michigan Medical School, Ann Arbor
University of Michigan Medical School, Okemos
University of Minnesota Medical School
University of Missouri, Medical School
University of North Carolina, Chapel Hill
University of Pittsburgh School of Medicine
University of Rochester Medical Center
University of South California School of Medicine
University of South Dakota School of Medicine
University of South Florida College of Medicine
University of Southern California/Norris Cancer Center
University of Tennessee Health Sciences Center
University of Texas Southwestern Medical Center
University of Texas Health Science Center, San Antonio
University of Texas Medical Branch, Galveston
University of Texas Medical School, Houston
University of Toledo Medical School
University of Utah School of Medicine
University of Virginia Medical School
University of Wisconsin Medical School
Vanderbilt University Medical Center
Washington University School of Medicine
Women & Infants Hospital
Yale New Haven Hospital

Academia

Auburn University
Bowling Green State University
Bridgewater College
California Institute of Technology
College of The Holy Cross
Cornell University
Dutchess Community College
Fairmont State College
Florida State University
Fort Lewis College
Hunter College
ITD
Louisiana State University
Michigan State University, East Lansing
Michigan State University, Williamston
National University of Ireland
Oklahoma State University
Oregon Health & Science University

Oregon State University
Rockefeller University
Roosevelt University
Rutgers University
San Diego State University
Seton Hall University
South Dakota State University
Sweet Briar College
Texas A&M University
University of Arizona
University of California, Davis
University of California, Riverside
University of Chicago
University of Cincinnati
University of Delaware, Lewes
University of Delaware, Newark
University of Denver
University of Florida
University of Georgia
University of Guelph
University of Illinois, Chicago
University of Illinois, Urbana
University of Louisville
University of Maryland
University of Minnesota, Minneapolis
University of Minnesota, St. Paul
University of Nebraska
University of Pittsburgh
University of Southern California
University of Tennessee
University of Texas
University of Toledo Pharmacy College
University of Washington, Seattle
University of Wisconsin, Madison
University of Wisconsin, Milwaukee
Wright State University

Government Agency

Argonne National Lab
Canadian Blood Services
Center for Disease Control & Prevention
Center for Veterinary Biologics
INEEL/National Engineering & Environmental Lab
INSERM/National Institute/Health/Medical Research
Lackland Air Force Base
Minneapolis Department of National Resources
National Animal Disease Center
National Institutes of Health (NIH)
New York State Department of Health
NIH/National Cancer Institute, Frederick

NIH/National Cancer Institute, Rockville
NIH/National Institute of Allergy & Infectious Diseases
NIH/National Institute of Diabetes & Digestive & Kidney Diseases
US Department of Agriculture Research Service, Aiea
US Department of Agriculture Research Service, Ames
US Department of Agriculture Research Service, Lincoln
US Department of Agriculture Research Service, New Orleans
US Environmental Protection Agency
US Geological Survey Biological Resources
Veterans Affairs Medical Center, Iowa City
Veterans Affairs Medical Center, Northport
Walter Reed Army Institute of Research

Private Research Foundation

Cedars-Sinai Medical Center
Cleveland Clinic Foundation
Cole Eye Institute
Evanston Northwestern Health Care
Hauptman-Woodward Institute
Kagen Allergy Clinic
Lahey Clinic
Mayo Clinic Foundation
MD Anderson Cancer Center, Houston
Minneapolis Medical Research Foundation
National Jewish Medical & Research Center
New England Regional Primate Research Center
Oklahoma Medical Research Foundation
Oregon Regional Primate Research Center
Roswell Park Cancer Institute
St. Jude Children's Research Hospital
The Science & Conservation Center
The Scripps Research Institute

QUESTION 19.

Question:

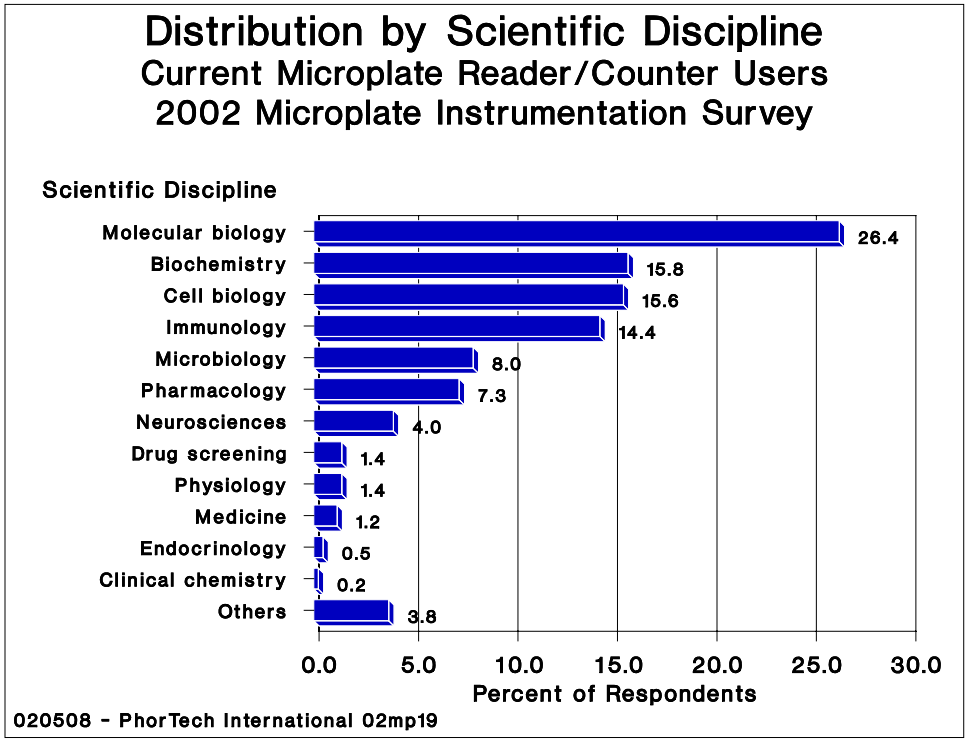
Please indicate below the scientific discipline in which you are involved: biochemistry, cell biology, clinical chemistry, drug screening, endocrinology, immunology, medicine, microbiology, molecular biology, neurosciences, pharmacology, physiology, or other.

Rationale:

With this question, we examine the usage of microplate techniques across a carefully selected list of major scientific disciplines.

Results:

The distribution of the 424 responses are depicted in the following horizontal bar chart.



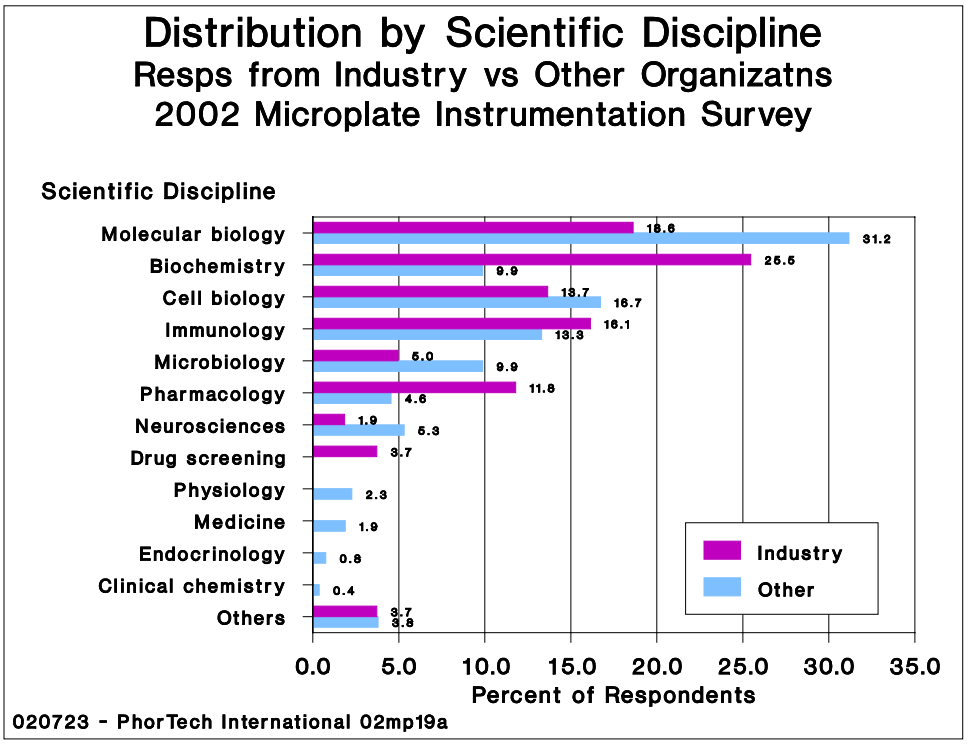
Molecular biology was the most common response, mentioned by 26.4% of scientists. Biochemistry, cell biology, and immunology together account for another 45.8%; each of the remaining disciplines represents less than 10% of all respondents.

Analysis:

Similar to many of the other areas of life science research, microplate readers and counters are used by researchers in a variety of disciplines. The largest

proportion of respondents are associated with the traditional disciplines of molecular biology, biochemistry, cell biology and immunology. According to our U.S. Laboratory Product and Usage Survey, these are also the areas of work used by the largest number of U.S. life science researchers.

In the following graph, we present the results for the 161 respondents working in industry separately from the 263 researchers from all other types of organizations. The disciplines have been maintained in the same order as shown on the previous graph.



For both of these groups, three out of every four respondents identify themselves with one of the top four disciplines. However, industrial researchers are significantly more likely to be working in biochemistry, pharmacology or drug screening, and significantly less likely to be involved in molecular biology or the neurosciences.