NOTES AND NEWS

PSAS PRESENTATION

On April 18, 1967 the Prosthetic and Sensory Aids Service presented highlights of its research program before the House of Representatives Committee on Veterans' Affairs. The session was chaired by Hon. William Jennings Bryan Dorn, Vice Chairman of the Committee. Dr. Robert E. Stewart, Director of PSAS, led the VA group. Dr. Oreon K. Timm, Asst. Chief Medical Director for Professional Services, introduced the program. Members of the staffs of the Research & Development Division, Prosthetic and Sensory Aids Service and the VA Prosthetics Center participated in the presentation.

Several subjects demonstrated upper- and lower-extremity prostheses and braces (Fig. 1). The laser cane, newly developed by Bionic Instruments, Inc., and described elsewhere in this issue, was shown (Fig. 2). A demonstration was made by a blind subject on the Mauch Visotoner.

FIGURE 1.—Miguel de Jesus, a bilateral leg amputee (below-knee and Syme) demonstrates for Congressman W. J. B. Dorn his ability to walk.

FIGURE 2.—R. C. Williams, Chief of VA's Blind Rehabilitation program, demonstrates the use of laser cane in detecting an obstacle at about the level of his head.

Slide presentations of cosmetic restorations and a specially edited version of the film on immediate postsurgical prostheses rounded out the program.

"PROJECT SLIDES"

Some six years ago the Prosthetic and Sensory Aids Service prepared sets of slides which were widely disseminated not only to VA facilities but also, through the efforts of the Committee on Prosthetic-Orthotic Education, to a number of educational institutions, rehabilitation centers, and hospitals. Another set of 100 slides has been prepared and will become available in the near future. In addition to VA's procurement of 100 sets of these new slides, the International Society for Rehabilitation of the Disabled has ordered 100 sets and the Committee on Prosthetic-Orthotic Education will purchase 400 sets.

A list of captions will accompany these slides. To enhance their value as teaching aids, a suggested pattern of slides for use with various lectures will be disseminated.

CLINICAL STUDY OF HENSCHKE-MAUCH MODEL A

The Research and Development Division of the Prosthetic and Sensory Aids Service is currently conducting a Clinical Application Study of the Henschke-Mauch Model A Swing-and-Stance Control System. This is the first clinical evaluation by the Veterans Administration of a hydraulic knee mechanism which offers stance-phase control in addition to swing-phase control. Data are being gathered relative to prescription indications, training considerations, and maintenance requirements. A total of forty subjects will be fitted with the test system during the evaluation. The VA stations currently participating in the study are:

VAH, Atlanta, Ga.
VAOPC, Boston, Mass.
VAH (West Side), Chicago, Ill.
VAH, Dallas, Tex.
VAH, Denver, Colo.
VAOPC, Los Angeles, Calif.
VAOPC, Philadelphia, Pa.
VAOPC, Providence, R.I.
VAH, Seattle, Wash.
VAC, St. Paul, Minn.

HUMAN LIMBS AND THEIR SUBSTITUTES

Published in 1954, the book, Human Limbs and Their Substitutes by Klopsteg and Wilson et al., still continues to be one of the outstanding texts in the field of prosthetics. Unfortunately, copies are no longer available for purchase.

Because of the interest shown by various groups around the world, arrangements have been made to have the book reprinted by the Hafner Publishing Company. The reprinted version will include an introductory statement by Dr. Herbert Elftman and an up-to-date bibliography. It is expected that the cost of the book will be $17.00.

We shall be pleased to notify interested individuals and organizations when the book becomes available. Let us know of your interest by writing to:

Research and Development Division
Prosthetic and Sensory Aids Service
Veterans Administration Regional Office
252 Seventh Avenue
New York, New York 10001

INSTRUCTIONAL COURSE IN IMMEDIATE POSTSURGICAL PROSTHETICS MANAGEMENT

During the 3-day period, January 5–7, 1967, the staff of the VA-supported research project in Seattle conducted an instructional course in Immediate Postsurgical Prosthetics Management (Fig. 3). Nine VA surgical-medical teams participated in this course. Dr. Ernest M. Burgess, principal investigator of this VA-funded project, served as senior instructor of the course. Dr. Robert L. Romano, Mr. Joseph E. Traub, and Mr. Joseph H. Zettl served as principal instructors.

The goal of this course was to disseminate the techniques developed by the Seattle project to a selected group of VA clinicians. A follow-up study is being undertaken to determine the effectiveness with which the nine field stations can replicate the techniques utilized in a research setting.

All participants in the instructional course were greatly impressed with the accomplishments of Dr. Burgess and his staff, which have resulted in early ambulation by amputees, reduced postoperative pain, shorter periods of hospitalization, and speedier return to gainful employment.

FIGURE 3.—Practice session in applying rigid dressing at Seattle instructional course.

UCOPE CONFERENCE ON IMMEDIATE POSTSURGICAL FITTING

Under the auspices of the University Council on Orthotics-Prosthetics Education (UCOPE), a conference on immediate postsurgical fitting procedures was conducted at Northwestern University on January 20–21, 1967. The purpose of this session was to determine the procedures involved in immediate postsurgical fitting which should be taught in the three universities offering prosthetics courses.

Presentations were made in five major areas: surgery, rigid dressings, components and materials, ambulation and weight-bearing, and plaster change routines, including sockets, suspensions, and temporary prostheses. Since the Seattle Prosthetics Research Study, under the direction of Dr. Ernest M. Burgess, has been doing most of the work in the area of immediate postsurgical fitting, this group made the initial presentations on each of the major topics. Mr. Joseph E. Traub and Mr. Joseph H. Zettl, prosthetists working closely with Dr. Burgess, supplemented his presentation. Other groups with experience in immediate and early fitting procedures followed the Seattle discussions and demonstrations. Thus, presentations were made by Dr. Augusto

Sarmiento and Mr. William F. Sinclair; Capt. Frank L. Golbranson and Mr. Charles C. Asbelle; Dr. Frank W. Clippinger, Jr. and Mr. Bert R. Titus; Dr. Clinton L. Compere and Mr. Frederick L. Hampton; Dr. Alfred E. Kritter and Mr. Richard G. Bidwell; Dr. William R. Murray; Dr. Vert Mooney and Mr. Roy Snelson; and Dr. Walter A. L. Thompson and Mr. Herbert Kramer.

At the conclusion of the session, members of UCOPE discussed plans for launching an educational program in this relatively new field of immediate postsurgical prosthetics fitting.

The conference was chaired by Dr. Clinton L. Compere and coordinated by Dr. Jack D. Armold. Serving as discussion leaders on the major topics were Dr. George T. Aitken, Dr. Frank W. Clippinger, Mr. John Bray, Capt. Frank L. Golbranson, and Dr. Sidney Fishman.

DR. ROSENKRANZ RETIRES

After more than 20 years of employment with the Veterans Administration, Dr. Gabriel Rosenkranz, Medical Consultant to the VA Prosthetics Center in New York, announced his retirement as of June 30, 1967.

Dr. Rosenkranz completed his medical training, including his internship and his residency, in Vienna. During his 10 years of medical practice in Austria, his specialties included athletic injuries and traumatology. He came to the United States in 1938 and passed State Board Examinations, both in New York and Massachusetts. During World War II he served as a Captain in the Medical Corps of the United States Army.

Dr. Rosenkranz's dedicated interest in prosthetics and orthotics has been of long standing. Many practitioners will remember his dynamic lectures at the suction socket courses conducted in the late '40's and early '50's. In 1949 Dr. Rosenkranz was a member of a study group which visited a number of European countries to study prosthetics practices. In 1951 he was consultant to the group of German prosthetics experts who toured the United States under State Department auspices.

For many years Dr. Rosenkranz served in a consultative capacity to the Prosthetic and Sensory Aids Service in New York. Since 1961 he has been a full-time Medical Consultant to the VA Prosthetics Center. The research and clinical programs conducted by the Center have profited from his scholarly counsel and guidance.

Dr. Rosenkranz has served as Medical Consultant to the Bulletin of Prosthetics Research. An avid reader, he has constantly stimulated staff members with news about developments in prosthetics and orthotics in other parts of the world. His translations, particularly from the German literature, have always been very helpful.

All of us who were privileged to be his "students" will long remember Dr. Rosenkranz's effective lectures. His enthusiasm and his sense of humor enhanced his presentations. His teaching aids typically revealed his imaginativeness and resourcefulness.

Although it is with great regret that his colleagues view his retirement from active professional life, we are all pleased that he will now be able to enjoy some of the many cultural and scientific pursuits that he has had to defer. We sincerely hope that his will be a happy and full retirement.

SYMPOSIUM ON MAXILLOFACIAL PROSTHETICS RESEARCH

With the financial support of the Veterans Administration, the American Dental Association conducted a symposium on Maxillofacial Prosthetics Research at the Windsor Park Hotel, Washington, D.C., on March 14–15, 1967.

Scientific sessions were held on: Current Concepts in Maxillofacial Prosthetics; Stabilization of Hard Tissues and Implants; Development of Tissue Compatible Plastics, Adhesives, and Dyes; Surgical Problems in Tissue Preservation; Tissue Reaction to Prosthetic Appliances; and Biological Assessment of Functional Alterations.

Participants included dentists, surgeons, and scientists from the Veterans Administration, the Armed Services, universities, and industrial laboratories.

SENSORY AIDS SUBCOMMITTEE MEETING

A meeting of the Subcommittee on Sensory Aids, CPRD, NAS–NRC, was held at the National Academy of Sciences' Building in Washington, D.C., March 30–31, 1967.

On the first day, after an orientation by Dr. Eugene F. Murphy of Prosthetic and Sensory Aids Service, Veterans Administration, and Professor Robert W. Mann, Massachusetts Institute of Technology, the following papers were presented: "Research and Evaluation" by Dr. James C. Bliss, "Evaluation" by Mr. John K. Dupress, and "Deployment" by Professor Robert W. Mann.

The morning of the second day was spent on panel discussions on the papers presented the preceding day. Professor John G. Linvill chaired the Research and Development panel; Dr. Benjamin W. White led the discussion on Evaluation; and Mr. Leslie L. Clark led the Deployment panel. In the afternoon a plenary session was held.

CONFERENCE ON HUMAN BODY DYNAMICS

A "Conference on Human Body Dynamics and its Application in Prosthetics and Orthotics" was held June 19–23, 1967, at Queen's College, Dundee, Scotland.

The conference covered amputee equipment and management in three major sections—normal and oriented function, replacement of function, and "team" management of the amputee. A "Prostheses Workshop" which dealt with amputation principles, limb fitting techniques, and devices and concepts such as modular prostheses provided the practical emphasis of the conference. The concluding session included an open topic discussion, summary of the conference, and guidelines for future development.

CONTROL MECHANISM PERFORMANCE CRITERIA FOR AN ABOVE-KNEE LEG PROSTHESIS

The following abstract is part of a thesis submitted December 1966 by John Wallach to the Department of Mechanics, Rensselaer Polytechnic Institute, Troy, New York, in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

A primary requirement of an above-knee leg prosthesis is that it enables the amputee to walk with a normal appearing walking pattern. The leg motion during the swing and stance phase of level walking should approximate that of a non-amputee. To accomplish this, a control mechanism is added to the conventional leg prosthesis. The mechanism usually uses springs and fluid damping to generate an axial force in response to axial displacements and velocities. By mounting the mechanism just behind the knee joint and halfway down the shank, the axial force produces a moment about the knee joint. This moment controls the movement of the shank relative to the thigh.

This study is concerned with the performance of the mechanism during the swing phase. The force-displacement-velocity relationships necessary to duplicate the normal walking pattern are determined. Then a mechanism with these characteristics is analytically evaluated.

The normal walking pattern for a normal man was obtained from the literature for average, tall, medium, and short men. The data consisted of tabulated experimental data for the linear and angular displacements of the normal leg. The data were smoothed and differentiated twice to obtain velocities and accelerations.

A mathematical model was chosen that typifies the mechanical-hy-

draulic mechanisms being developed. The physical constants were calculated from data collected from many sources. Most of the data have not been published. The force-displacement-velocity relations for the control mechanism, and the expressions for the hip reactions and power were derived. These were numerically evaluated for each height group assuming that the man was walking with a normal walking pattern.

From the above force-displacement curves, spring characteristics were determined for the control mechanisms for each height group. Then the damping coefficients were determined for these mechanisms.

For the average man a complete analytical force-displacement-velocity expression was determined. The expression completely defines the control mechanism performance characteristics. The design is evaluated by determining the knee angle curves obtained when it is used by each height group, and when the average man uses it at various cadences.

The performance criteria for a control mechanism for an above-knee prosthesis are presented as a set of force-displacement-velocity curves. A mechanism designed to approximate the performance characteristics for an average man will perform satisfactorily for the tall, medium, and short man, as well as for the average. The mechanism will also perform satisfactorily for the average man in a range of cadences of approximately 80 to 120 steps per minute.

COMMITTEE ESTABLISHED BY NAE ON ENGINEERING IN MEDICINE AND BIOLOGY

A U.S. National Committee on Engineering in Medicine and Biology was established by the National Academy of Engineering to enable engineers in the United States in the fields of medicine and biology to participate in the activities of international organizations, such as the International Federation for Medical and Biological Engineering.

Additional purposes of the committee are to facilitate cooperation among United States societies that represent engineering interests in medicine and biology, and to advise the NAE president on international matters in biomedical engineering.

Administrative responsibility for the committee rests with the NRC Division of Engineering. Staff executive for the committee is James R. Kingham, who also continues his duties as staff editor of the NRC Committee on Prosthetics Research and Development.

Appointments to the national committee, effective November 1, 1966, were made on the basis of nominations invited from a number of organizations. Chairman pro tem is Murray Eden, Center for Com-

munications Sciences, Massachusetts Institute of Technology. Other members are Dr. Ralph E. DeForest, Director, Dept. of Postgraduate Programs, AMA; Leo Fox, Human Research Division, NASA; Edward F. Leonard, Dept. of Chemical Engineering, Columbia; Harold W. Shipton, State U. of Iowa College of Medicine; Lawrence Slote, Grumman Aircraft Engineering Corp.; and Dr. Sigmund A. Wesolowski, Mercy Hospital, Rockville Centre, N.Y. Additional appointments may be made from time to time to insure broad representation of all aspects of engineering in medicine and biology. Appointments are normally for 3-year terms so arranged that approximately one third of the members are replaced each year.

The new committee is planning U.S. participation in the Seventh International Conference on Medical and Biological Engineering that will be held in Stockholm, Sweden, August 14–19, 1967. To support U.S. participation, the National Institutes of Health awarded a $35,000 contract to the NAE. It is the responsibility of the U.S. National Committee to establish criteria and to select American engineers and scientists to receive travel grants to attend the conference.

2ND ANNUAL BIOMECHANICAL AND HUMAN FACTORS CONFERENCE

The Biomechanical and Human Factors Division of the A.S.M.E. held its second annual conference at the International Inn, Washington, D.C., April 3–5, 1967.

The first session on April 3rd, chaired by Dr. Eugene F. Murphy of the Prosthetic and Sensory Aids Service of the Veterans Administration, was entitled "Restoration of Impaired Human Functions." Howard Freiberger, Electronics Engineer, Prosthetic and Sensory Aids Service, Veterans Administration, presented a paper and slides on "Rehabilitation Aids for the Blind."

Other papers in this session included "Aids for the Deaf-The Mechanics of Bone Conduction" by Philip E. Rosenberg, Professor of Audiology, Temple University, School of Medicine; "Metals for Surgical Implants" by Sidney Weisman, Mgr., Metallurgical Research Dept., Medical Div., Howmet Corp.; and "Development of a New High Efficiency Artificial Kidney" by Lars Grimsrud, Research Assistant Professor, University of Washington.

There were three additional sessions, encompassing various other phases of human factors, during the conference. The complete program is documented in a bound volume that is retained permanently by the United Engineering Center and other technical libraries.

JOSEPH TRAUB JOINS VRA

Joseph Traub, formerly Project Director of the Seattle Prosthetics Research Study in which the immediate postsurgical fitting techniques were developed for the Veterans Administration, is joining the staff of the Vocational Rehabilitation Administration of the Department of Health, Education, and Welfare. Mr. Traub, effective July 1, 1967, will become Consultant on Prosthetics and Orthotics to Dr. James F. Garrett, Associate Commissioner of VRA.

Mr. Traub, who worked with Drs. Burgess and Romano and Mr. Joseph Zettl in developing what has now been termed the "Seattle Method" of immediate fitting, has been involved in many other pioneering efforts in prosthetics and orthotics. He was one of the first to advocate a four year baccalaureate curriculum for prosthetists and orthotists. Later he was active in UCLA's educational programs. His new position will afford him the opportunity to develop VRA's several prosthetic and orthotic programs to the benefit of a large number of disabled persons. We in the Veterans Administration look forward to a close liaison producing advantages for our several agencies.

Mr. Zettl has been named Project Director of the Seattle project.

BIOELECTRIC CONTROL OF PROSTHESES

The following is an abstract of a thesis that was submitted to the Department of Electrical Engineering, M.I.T., August 23, 1965, by Ralph Alter, in partial fulfillment of the requirements for the degree of Doctor of Science.

Externally powered prostheses have been studied for many years in efforts to provide more effective rehabilitation of amputees. In order to take advantage of the benefits offered by external power in prostheses, however, the mode of control of the prosthesis by the amputee must also be improved. Conventional control methods require a high degree of mental concentration on his prosthesis by the amputee because of at least two important factors: 1. the mode of control of a prosthesis conventionally is different from control of the corresponding normal action, and 2. there is no feedback of sensation from the prosthesis to the patient except through the visual sense. [Feedback sometimes comes through tension in actuating cables, stump force reaction, and sounds of the operating prosthesis.]

Bioelectric control offers the possibility that control of the prosthesis can be similar to control of the corresponding body action. The muscles in the body produce an electrical signal which can be sensed directly from the surface of the skin. Several experimental prostheses have been

developed previously, which use myoelectric signals for control purposes. The major shortcoming of most of these devices has been the lack of graded control of their behavior.

A system has been developed which utilizes surfaced myoelectric signals from the biceps and triceps of an amputee's arm to provide graded control of an elbow prosthesis. The development included as an intermediate step the control of a simulated forearm in a digital computer, in real time. In its present form the signal processing consists of full-wave rectification and low-pass filtering of the myoelectric signals from biceps and triceps muscles. An actual mechanical elbow prosthesis can now be voluntarily controlled through the subject's myoelectric signals.

The performance of the system in its present form is described in the thesis, and its indications for future work are outlined. Foremost among these is the need for feedback to the patient of (at least) position information from the prosthesis, outside of the visual sense. One method by which it may be possible to accomplish this is in an inherently normal manner. The method involves having part of the socket push on an existing muscle in proportion to the artificial member's displacement.

The use of nerve signals as the control signal for a prosthesis offers many potential advantages over the use of the myoelectric signal; the practical problems involved in observing nerve signals, however, combined with the lack of information as to how to interpret them properly, makes this approach infeasible now. Preliminary experiments aimed at deriving the necessary information in order that nerve signals can ultimately be used are described in the thesis. The results are still inconclusive.

CORRECTION

We are taking this opportunity to publish a correction in the manual on Immediate Postsurgical Prosthetics in the Management of Lower Extremity Amputees. Pages 43, item 8, should read: "It is usually desirable to inset the socket-attachment plate ½ inch medially (fig. 38). The illustration on page 46 is correct."