Onward IBP!

- The first 10 years -

This year marks significant milestones for IBP and the medical school. It seems like only yesterday, ... and yet it was 10 years ago that we began our shared journey toward building the Department of Integrative Biology and Physiology, representing an exciting new chapter in the storied history of the medical school. On this point, IBP is pleased to join in to help celebrate the 130th anniversary of the medical school, founded in 1888. Hats off to IBP and the medical school on these important milestones!

IBP’s journey over the past decade has been filled with tremendous opportunities, successes, and some unique challenges naturally associated with being a new and growing department. Along the way, we have been guided by the unified goal of building an outstanding department.

Our shared vision of excellence in all three phases of our mission - scholarship, education and service - has been, and continues to be, the cornerstone of who we are.

Departments are ultimately defined by the excellence of their faculty. IBP can take great pride in the 19 outstanding faculty currently in rank, with more on the way. This year IBP is very pleased to welcome Dr. Xavier Revelo from the University of Toronto. Dr. Revelo’s new lab, which is focused on the dynamic intersection of metabolism and immunology, is off and running with new hires and new collaborations being formed. In addition, IBP is delighted that Dr. Jesse Williams, Washington University, will be joining us next year, in the spring of 2019. Dr. Williams’ research program centers on cardiovascular immunology. Jesse’s arrival will usher in a new collaboration between IBP and the UMN Center for Immunology, under the direction of Dr. Marc Jenkins. This new and exciting partnership enables IBP to further expand and strengthen connections with UMN flagship programs of excellence.
Dr. Anne Carpenter, Ph.d., is a rising star in the field of image-based cell profiling and an Institute Scientist directing the Imaging Platform at the Broad Institute of Harvard and MIT. The title of her lecture was, “Robots vs disease: Tackling world health problems by analyzing cell images.” Her lecture was followed by a reception on the terrace of the Campus Club, where student achievements were mentioned, and the incoming class was welcomed.

**STUDENT ACHIEVEMENTS:** The graduate program is thriving and there is lots of student news to report. Snider Desir successfully defended his thesis and is now planning to go to medical school. Mayank Verma and Amritha Yellamilli also successfully defended their thesis projects and are currently doing their medical school clinical work. Amritha won several awards, including 2nd place in the 3-minute thesis award, the people’s choice award; the Bacaner Research Award, and the J. Jacob Kaplan Award (most meritorious student papers on either clinical or basic medical research). Last but not least, Anthony Vetter successfully defended his thesis and is currently finishing up some work in Dr. Metzger’s laboratory. Amber Lockridge and Tanya Meyers continue to progress well in their thesis work, which have been funded by NIH F31s for both students. Congratulations to Amber and Tanya for getting their first “YES” from NIH! Amber also received the Steer Family Award in Diabetes Research. Kadambari Shekar and Carolina Ortiz are progressing well in their thesis work, and Carolina helped organize the Biomedical Research Day event this year.

Third year students Alexie Larson, Naixin Zhang, Michaela Jones and Iffy Akinola have navigated their first two years and are continuing with thesis work. Alexie helped to organize the Zofia Zukowska fall welcome event, successfully competed for a training grant and received the Lifson Johnson Memorial Award for excellence in teaching. Second year students include Daniel Baumann, Thu An Nguyen, Pedro Rodriguez and Dogacan Yücel. Daniel, Pedro and Dogacan have found labs and are starting their thesis work. The Hemingway award, which is given to the student with the best GPA in their first year of the program, went to Dan Baumann. Congratulations Dan!

**INCOMING CLASS WELCOME:** This year the IBP graduate program welcomes two new students: Brandon Wagner and Jae Hwi Sung. Brandon and Jae have both arranged their first year’s rotations and are immersing themselves in all the IBP seminars and events. Welcome to Brandon and Jae Hwi!

**NEW GRADUATE STUDENTS**

**Brandon Wagner**
I was born and raised in the Twin Cities. I graduated from the University of Minnesota in 2018 with a B.A. in Physiology. As an undergraduate, I began working in the O’Connell Lab at the beginning of 2017, where we investigated the role of Free fatty acid receptor 4 (Ffar4) in a mouse model of heart failure. After graduating, I spent the summer of 2018 rotating in the O’Connell lab working on a project studying the heterogeneity of Gq-receptor expression in adult mouse cardiac myocytes.

**Jae Hwi Sung**
I grew up in Korea, and graduated from Korea University with a BHS and MS degree in Biomedical Science. When I was in Korea, I worked at 3 different laboratories in the field of cardiac electrophysiology, clinical chemistry and natural product and molecular diagnostics. I want to pursue a career in cardiac physiology at the University of Minnesota. My goal is to integrate basic physiology and clinical physiology.
ONWARD IBP!, continued

We are very pleased to recognize Dr. Tim O’Connell for his promotion to Associate Professor, with tenure. Dr. O’Connell’s research program is at the forefront of cardiac muscle cellular signaling and he represents perfectly IBP’s commitment to scholarship, education and service. Congrats Tim!

IBP is continuing its non-stop recruiting efforts on multiple fronts, including both in house/IBP initiated recruiting, and through new partnership opportunities across campus. These new partnerships include opportunities with UMN’s medical discovery teams to help further strengthen our shared goals.

This year also brings about major changes in IBP leadership. Dr. Lisa Anderson takes over the helm as IBP Director of Education, taking the baton from Dr. Steve Katz. Hats off to Lisa for this leadership position and to Steve for his many years of outstanding service to the department. Thank you!

Speaking of excellence, Dr. Alessandro Bartolomucci was awarded the inaugural Ancel Keys Scholar in Physiology and Metabolism. Alessandro’s seminal studies in stress, metabolism and physiology make him the ideal first recipient of this distinguished award. Congratulations Alessandro!

The past year has seen many key developments, including christening IBP’s “new” undergraduate major in Human Physiology. We envision this program to grow considerably in the coming years and be the “go to” program for undergraduate students seeking excellent preparation for professional careers in medicine, allied health and biomedical research. This was truly a team effort, including many faculty, and featuring the efforts of Dr. Vince Barnett, IBP Director of Undergraduate Education. Great work Vince!

IBP’s successes can be attributed to our “all hands on deck” and “can do” approach. In this context, it is bittersweet to acknowledge and thank Dr. Randi Lundell, IBP’s lead administrator from the beginning, on her outstanding 10 year service to IBP. Thank you Randi! The baton has now been passed to Jean Otto and she hasn’t missed a beat in facilitating excellence in research, teaching and service, the three pillars of the department.

In looking ahead, continued growth and impact are in the future for IBP. To this end, it will be key to continue to develop, nurture and expand points of contact and collaboration across campus. IBP collaboration and partnerships with LHI, CFI, Cardiology, Endocrinology and Metabolism, BME, MDTs, medical school basic science departments, CSE and many others will be essential ingredients to the “secret sauce” of success for IBP in the years to come.

By working together, including all students, staff and faculty, we can be rightly proud of our first 10 years together. IBP is making an impact in the medical school and university at large.

What will the next ten years hold? Peering into the future, based on our past successes, we expect continued growth with increased visibility and impact all towards the ultimate goal of positioning IBP at the forefront of stellar programs nationwide.

Onward IBP!

Sincerely,

[Handwritten signature]

Joseph M. Metzger Ph.D.
Maurice B. Visscher Endowed Chair in Physiology Professor and Chair of the Department of Integrative Biology and Physiology
Dr. Lisa Carney Anderson,
Director of Education

This past July, Dr. Anderson became the Director of Education in IBP which includes assuming the course directorship of Medical Physiology. The education mission of the Department of Integrative Biology and Physiology (IBP) focuses on physiology and anatomy classes aimed at undergraduate, graduate, medical and professional students. For the year ending in June 2018, we offered more than 40 separate courses reaching over 3,000 students and yielding total revenue of approximately $6 million, (including our January Short Courses for industry professionals). Our teaching faculty has grown from five to seven fulltime teachers (Drs. Anderson, Barnett, Cook, Katz, Olson, Weinhaus and Wu). In addition, the IBP research faculty all contribute to our teaching excellence. Our teaching mission is augmented with about a dozen additional faculty who teach part-time in IBP and well over 50 student teaching assistants!

Dr. Wu has assumed course directorship of Principles of Physiology (3061) and co-directorship of the Systems Physiology course (Dental School). Dr. Olson has assumed the course directorship of Human Physiology (3051).

Dr. Weinhaus, Dr. Cook and the rest of the Anatomy faculty have accomplished a major revision of our medical school course, Human Structure and Function; they have reorganized the content and recorded videos for the entire course --- what a great accomplishment! Medical Physiology, continues to place very well above the mean in each of 7 separate areas of medical school course comparisons under the leadership of Dr. Katz. IBP continues to be a teaching powerhouse because of our accomplished faculty.

Undergraduate Physiology
Vincent A. Barnett
Director of Undergraduate Education

The Undergraduate Physiology Society (UPS) again kicked-off the fall term with an ice cream social for physiology students. UPS also sponsored three well-attended study sessions where faculty answered questions for Principles of Physiology students, to help them prepare for exams.

UPS sponsored a team-building bowling event to start the spring semester. UPS members also participated in meal preparation and serving at the downtown Minneapolis House of Charity. Other UPS events introduced members to services provided by the CLA career services office and a chance to participate in a clinical ethics workshop provided by the EPPA medical scribe program.

Undergraduates engaged in physiology research were given an opportunity to share their discoveries at IBP’s first Undergraduate Research Symposium. Three students presented oral presentations and twelve posters were shown during the inaugural event. We look forward to growth of this showcase for IBP-affiliated student research. Enrollment in the major continued to rise during the year and we finished the spring term with 370 majors.

In May 2018, a name change was approved for the Physiology major by the University Board of Regents and our undergraduate program is now known as the Human Physiology major. This name change reasserts the connection of the IBP supported major to the biomedical sciences. It also provides a clear message to prospective students on our major’s emphasis and direction.

In the summer of 2019, Dr. Anderson and I will be hosting the Physiology Majors Interest Group in Minneapolis.
IBP SPECIAL EVENTS

9th Annual Visscher Symposium – 2018

The 9th Annual Visscher Symposium was held June 11, 2018, featuring keynote speaker, Dr. Barbara Kahn of the Harvard Medical School. The title of her keynote was “Novel Signaling Lipids That Regulate Glucose Homeostasis And Inflammation”. The auditorium was filled to capacity for this event, which was followed by an evening reception at the Weisman Art Museum, Dolly Fiterman Gallery and the Young Investigator award ceremony.

Patrycja Puchalska, first place post doc category

Lee Meier, first place graduate student competition

Sabrine Garrison, Highest GPA

Jordan Keeler and Michael Wurzer, Undergraduate Physiology Society Co-Presidents

Barbara Kahn, M.D.

Maurice Visscher family

IBP, in collaboration with the Lillehei Heart Institute and Cardiology, led another highly successful cardiovascular retreat this past July, 2018. Cardio Palooza 10 featured over 235 faculty, students and fellows in attendance at CCRB. It featured 35 faculty judges with 82+ posters and three short talks by young investigators representing both basic and clinical sciences, Xavier Revele, Jin O-Uchi and Beshay Zordoky.

Award winners were Meghana Iyer, Summer Scholar, Lee Meier, Graduate Student, Zhongming Chen, Post Doc/Scientist, Jason Allen, Clinical Fellow and Anthony Vetter, with the People’s Choice Award. Save the date for Cardio Palooza 11 on July 31, 2019.
Welcome to new IBP faculty!
This year, we are pleased to welcome new tenure track faculty to IBP, Dr. Xavier Revelo. Dr. Revelo grew up in Ecuador and received his BS from Zamorano University, MS from the University of Vermont, and PhD from the University of Missouri. Dr. Revelo completed his postdoctoral training at the University of Toronto. His research interests are molecular and integrative biology of metabolism and diabetes with emphasis on the immune mechanisms that drive inflammation during obesity and non-alcoholic fatty liver disease. Welcome Xavier!

O’CONNELL PROMOTION:
Dr. Timothy O’Connell was promoted to Associate Professor with tenure on July 1, 2018. Tim received his B.Sc. from the University of Illinois at Chicago in Bioengineering (1990) and Ph.D. from the University of Michigan (1995). His research focuses primarily on the G-protein coupled receptor (GPCR) signaling in heart failure. His lab investigates the function of GPCRs in models ranging from molecular signaling in primary cultures of cardiac myocytes to whole animal physiology. Current projects in the O’Connell lab include defining the cardioprotective effects of eicosapentaenoic acid (EPA) mediated activation of free fatty acid receptor 4 (Ffar4) in heart failure and developing a next-generation alpha-1-adrenergic receptor antagonist without cardiac side-effects for the treatment of hypertension. Congratulations to Tim!

Alumni Profile
Matt Hedlund, B.Bm.E., B.A.
Matt Hedlund is a medical device professional with a passion for the development of life improving technologies. Matt graduated from the UMN Departments of Biomedical Engineering and Integrative Biology & Physiology in 2012. He held executive board positions in the Undergraduate Physiology Society for two years, serving as president during his senior year. Matt has held multiple positions in the medical device industry working with technologies ranging from cardiovascular to renal and neuromodulation. He is currently a Senior Applications Engineer at Benchmark (www.bench.com), where he provides engineering design and manufacturing services for new medical devices, working with companies ranging in size anywhere from startup to Fortune 500. He lives in Seattle, Washington with his wife Meagan, an Alumna of the UMN Departments of Civil Engineering and Industrial & Systems Engineering. Outside of the office, Matt serves as the Chair of the Seattle Chapter of the Engineering in Medicine & Biology Society.
IBP Phenotyping Core

The **IBP Phenotyping Core** is an Internal Service Organization (ISO) created to offer University of Minnesota faculty highly specialized equipment, surgical and technical expertise and data analysis capability in the area of metabolic and cardiovascular phenotyping and stress physiology ([http://www.researchservices.umn.edu/services-name/integrativebiology-and-physiology-phenotyping-cores](http://www.researchservices.umn.edu/services-name/integrativebiology-and-physiology-phenotyping-cores)). Alessandro Bartolomucci, Ph.D., is the Core Director, Pilar Ariza-Guzman, D.V.M., M.S., is Core Manager, and Maria Razzoli, Ph.D., is the Metabolism and Behavior Specialist.

Major services include:
- Whole animal energy expenditure: Oxymax/CLAMS Lab Animal Monitoring System (Columbus Instruments, Columbus, OH).
- Body composition and organ fat and fat-free composition (Echo-MRI 3-in-1, Echo Medical Systems LLC, Houston, TX).
- Automated Food Consumption and meal pattern analysis (BioDaq, Research Diets, Inc.).
- Cardiovascular functions in freely moving rodents using Data Science’s radiotelemetry system (Data Science International, St Paul, MN).
- Non Invasive Blood Pressure Monitor (CODA, Kent Scientific).
- Specialized surgery and echocardiography analysis in mice and rats.

**New Service offered in 2018:**
1. New radiotelemetry service is offered by the IBP Phenotyping Core in collaboration with Data Science International (DSI), St Paul, MN. The Core users would be able to select any of the DSI-manufactured miniaturized radiotransmitters for wireless recording of mouse physiology (blood pressure, ECG, EMG, heart rate, temperature, activity and blood glucose).
2. Starting in the Fall 2018, the Core will offer a noninvasive Blood Pressure monitoring system (CODA® High Throughput monitor for 6 mice, Kent Scientific).

**Economic impact of the core:**
Approximately 50% of the billings were from sponsored accounts. 22 different sponsored chart strings were used to pay for core service. The vast majority of these grants were from NIH, others included: ADA, AHA, Foundation for Prader-Willi Research, International Cardio Corporation, etc. The total annual direct cost awarded to these 22 grants is $3,448,221 and the total indirect costs is $1,428,285. This is an underestimation of the economic impact of the core because it is impossible to provide similar figures for intramural grants (some of which are competitive grants such as the Wallin Neuroscience Discovery, etc). For all those grants (intramural and extramural), independently from the dollars spent in the core, there is no alternative to the service offered by the IBP Core for performing the proposed experiments.

**Scientific impact of the core:**
Since its inception in 2015, the Core has served over 60 PIs affiliated with more than 15 different departments, spanning four different schools at the University of Minnesota. In FY18 the Core supported 35 grant proposals (NIH, ADA, Foundations, etc) that included one or more IBP Phenotyping Core service.

The main Core facility is located in the Cancer Cardiovascular Research Building (CCRB), while select services are also available on the 1st floor of Jackson Hall.
MISSION STATEMENT

Department of Integrative Biology & Physiology
University of Minnesota Medical School

Dedicated to an integrative systems biology approach to bio-medical discovery. We partner with colleagues across disciplines to investigate questions ranging from the gene/molecule to the intact animal, while striving for excellence in research and dissemination of new knowledge with local, national, and global impact.

Committed to mentoring and training graduate students and fellows. We empower students to develop a deep understanding of the complexity of physiological systems to enable them to pursue unique career pathways spanning from academia to bio-industry.

Devoted to excellence, innovation and scholarship in education.
We educate undergraduate, graduate and professional students in the integration of structure and function of cells, organ-systems, and living animals, providing a strong foundation for knowledge discovery in basic science and human health fields.

Make a Gift to IBP

The generosity of individuals who recognize the importance of our department’s work is indispensable to our success. Donate online at http://www.give.umn.edu/give/physiology.