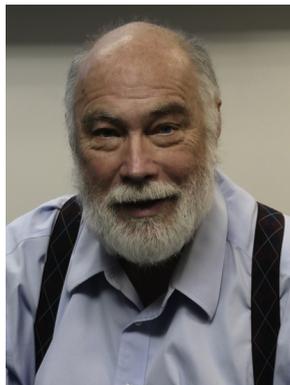


Giants in Obstetrics and Gynecology Series: Philippe Jeanty, MD, PhD, a pioneer in the study of fetal anatomy, biometry, growth, and congenital anomalies



Roberto Romero, MD, DMedSci

Philippe Jeanty, MD, PhD, a pioneer in obstetric and gynecologic ultrasound, has made key contributions to the study of fetal anatomy, biometry, growth, and the diagnosis of congenital anomalies. He is regarded as one of the most influential mentors and teachers in the field. His enthusiasm for ultrasound was inspiring, as was his generosity and modesty. He passed away in his home in Fairview, Tennessee, the day before Thanksgiving in 2020. He is recognized as a “Giant in Obstetrics and Gynecology.”



Dr Philippe Jeanty

intrigued by two subjects: biology and art history. He chose the profession of medicine as his life’s work.

Medical School: the Free University of Brussels

Medical school in Brussels was essentially free (equivalent of \$2 per year) when Philippe enrolled at the Free University of Brussels. There was no entrance exam; the requirement had been eliminated in accord with the political norms of the time: everyone

should have the right to enter medical school. Instead, everyone had to take an exam six months into the first year, and this was the greatest “filter.” Philippe’s score ranked 10th out of 1300 students’ results.

During his first hospital rotation, Philippe spent several weeks caring for a man who was dying from femoral osteosarcoma. Characteristically, he would visit the patient at night to comfort him. “I would give him sips of water with a spoon, hold his hand, wipe his forehead, fix his pillows as moving his leg was very painful, and he would slump in the bed. I was not there for his final day unfortunately.”

A decade later, a colleague recalled that on the last day before he died, the man had said, speaking of Philippe: “That young doctor with his long hair, he will be a good doctor!” Philippe wrote some years later about this, commenting: “I was a hippie with shoulder-length hair, yet that old man had seen beyond the very unconventional appearance in a hospital at the time. His kindness was a great lesson to me.”

Philippe’s First Paper: a Case Report as a Medical Student

In his penultimate year of medical school, Philippe published a case report of an infant with Smith-Lemli-Opitz syndrome, a genetic disorder characterized by slow growth and microcephaly, a result of a deficiency of the enzyme 7-dehydrocholesterol reductase.¹ What made the case remarkable was that this infant did not present fetal growth restriction, and the diagnosis, therefore, was challenging. Philippe contacted Dr Luc Lemli, a geneticist, who took a plane to see the infant and confirmed the diagnosis.

Philippe’s interest in Radiology emerged after he walked into a classroom where Professor Roland Potvliege, a radiologist, exhibited a chest X-ray and used a deductive approach to not only discuss the diagnosis but also the lifestyle choices

Early Life: From Africa to Europe

Philippe was born in Kinshasa, Zaïre, now the Democratic Republic of the Congo (Figure 1). During his formative years, he was aware of being “different,” and that difference persisted when he moved with his family to Brussels, Belgium. He wrote: “I was born in Africa and ever since, my playmates have been telling me that I spoke in a funny way” (Figure 2).

Philippe’s parents were physician-scientists; his mother, Dr Madeleine Lejour, was Chair of Plastic Surgery at the Free University of Brussels, and his father, Dr Claude Jeanty, was a gastroenterologist. This birthright gave Philippe a foundation for the career he would ultimately pursue, although he recalled that his father did not encourage him to engage in a medical career.

Philippe had one sister, Claire, and he thought very highly of her. He described her as being “pretty, smart, organized, and an excellent student” – something that resulted in a comparison to her academically. As he grew up, Philippe took this lesson to heart. Thereafter, he promised himself never to compare siblings, faculty members, sonographers, and fellows. Although young Philippe was generally uninterested in school, he was

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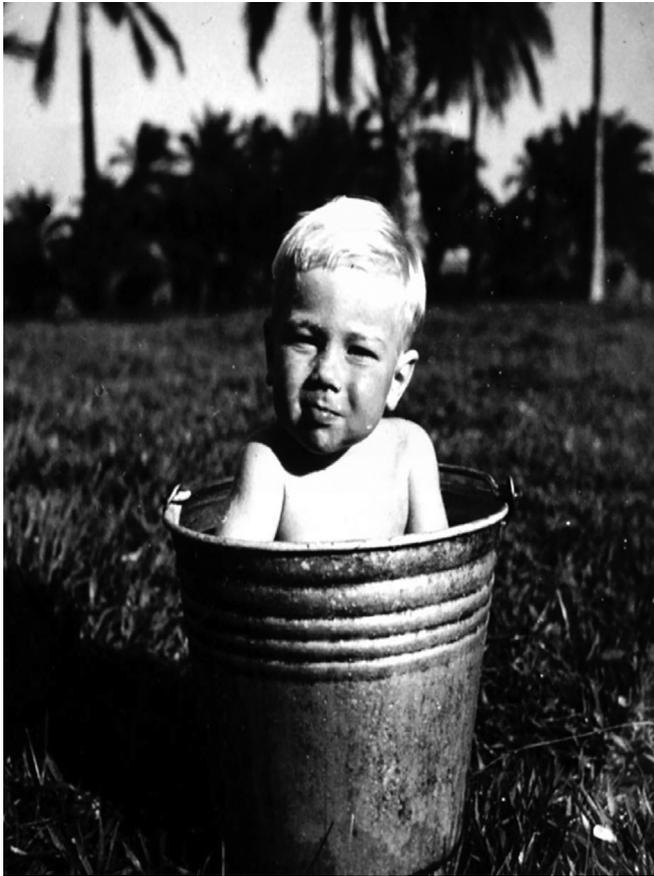
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FIGURE 1
Philippe as a baby



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FIGURE 2
Philippe with friends in the Congo



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of the patient. Philippe wrote: “What fascinating detective work this was! I went straight to the medical bookstore and bought a radiology book and was enthralled by all the pictures. I loved taking black and white photographs and this was ‘talking’ to me.” He adjusted his rotations to focus more on radiology, and his path was set.

Philippe’s real “wow” moment came when he first saw ultrasound performed on pregnant patients. He was impressed by the images and the visualization of a beating heart and the reactions of the parents at seeing their babies for the first time. In 1978, Philippe graduated an MD from the Free University of Brussels with “The Highest Honor” and opted for a residency in Radiology.

A Residency in Radiology at the Free University of Brussels

Philippe’s residency started in a newly opened modern hospital affiliated with the Free University in Brussels. At the time, ultrasound was a secondary imaging technology in Radiology. Philippe began using a static scanner (of which there are no pictures available today), and he said that he learned on his own, by making mistakes. One day, he was asked to give a local presentation in Belgium about ultrasound imaging, but he

realized the only things he had to show were his mistakes and erroneous diagnoses. Therefore, he decided to give a talk entitled “Pitfalls and Artifacts,” and this became one of Philippe’s signature lectures over the years.² Typically, Philippe transformed setbacks into opportunities and he always told stories of incorrect diagnoses without regrets.

Philippe completed the work for his PhD in fetal biometry—the assessment of fetal growth by the measurement of biological parameters, which, in this case, were long bones. At this very early time in ultrasound imaging, when ultrasound did not yet clearly discern the bones, Philippe undertook a major project to measure all the long bones in a large number of fetuses: humerus, femur, ulna, radius, tibia, and fibula.

This endeavor led to Philippe publication of two papers in the most prestigious journal in the field, *Radiology*.^{3,4} The papers contained fetal long-bone charts for the humerus, ulna, radius, femur, tibia, and fibula, and showed measurements for the 5th, 50th, and 95th percentiles as a function of gestational age. The impact and importance of this early work are clear today: look at any modern ultrasound machine and the nomograms are those of Jeanty.

Moving from Europe to the United States of America

By the end of his residency in Belgium, Philippe had been prolific and was academically inclined. Even at this early stage, the simplicity of the titles he chose for his papers served to attract readers and was a reflection of his pragmatic approach to medicine, life, and research.

He was attracted to the United States given his interest in academic freedom and the idea of living in the “land of opportunity.” Philippe attended an American Institute of Ultrasound in Medicine (AIUM) meeting in San Francisco, California where he gave 12 presentations and posters and attended as many lectures as possible. At every opportunity, he announced that he was looking for a position in the States. After a short exchange, Dr John Hobbins offered him a position at Yale University—on the spot (Figure 3). It was an exciting opportunity for Philippe, and although he did not fully realize Yale’s prestige until he arrived on campus, he knew of Dr Hobbins as the author of the book he had used throughout his residency, *Ultrasonography in Obstetrics and Gynecology* (“the orange book”).

Philippe landed in the Department of Obstetrics and Gynecology at Yale University, a typically fearless move on his part—most would seek a position in Radiology rather than Obstetrics and Gynecology. It is a testament to his confidence that he could make contributions to the field this way—and those contributions came at a fast pace.

Fetal Anatomy

Anatomy is the essential basic science for radiologists, and Philippe brought that interest to imaging in Obstetrics and Gynecology. One of his early papers was a description of fetal facial anatomy features. I personally enjoyed the experience of seeing what at first glance could be interpreted as noise and artifact and extracting valuable information about anatomy. For example, we went on to describe the anatomy of the fetal eye,⁵ as well as vascular anatomy, before the development of color Doppler velocimetry.⁶ Philippe was the first to see the coronary artery emerging from the aortic root. We also corrected many mislabeled anatomic structures, such as the interhemispheric fissure and Sylvian fissure of the fetal brain.⁷

Fetal Growth of the Limbs, Abdominal Circumference, and Estimated Fetal Weight

While in Belgium, Philippe performed the first study of fetal growth that went beyond the biparietal diameter, and he described the growth of long bones⁸, abdominal circumference⁹, and, subsequently, estimated fetal weight.¹⁰ The study was done by inviting medical and paramedical personnel to volunteer for ultrasound examinations frequently during pregnancy. The first velocity charts for abdominal circumference and estimated fetal weight were generated by Philippe and his research team.^{11–13}

Improving the Technique for Amniocentesis

Philippe also made technical innovations during this time, including a method for improving an amniocentesis technique that involved inspiration from a plastic wrap used to preserve leftover pancakes.^{14,15} A keen cook, Philippe had noticed the potential of the plastic wrap and developed a way to use it to aid amniocentesis. He suggested putting the needle along the side of the transducer to visualize the tip, then attaching the needle with a connector so as not to force the movements of the operator and, vitally, not to injure the fetus

FIGURE 3

A very rare moment: Philippe (right) with Dr John Hobbins (left)



Philippe is wearing a three-piece suit with clogs (not shown).

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by ensuring the needle was free floating. This is how I still perform amniocenteses today.

The Book *Obstetrical Ultrasound: A Story of Computers and an Accident*

Philippe arrived at Yale while I was on the faculty. Although we worked in the same department, we had little contact other than the presentations at rounds. The department was not well off financially, so when we both submitted our requests to attend a scientific meeting, Ms Ingebor Venus, the coordinator for the Perinatal Unit, told us we could go, but on one condition—we needed to share a hotel room to save money. We agreed. Philippe and I were both affected by insomnia, and after the first day of the meeting, instead of sleeping, we spoke about the need for a practical book on obstetrical ultrasound. We took pride that the idea was so, well, practical that we purposely omitted the usual first chapter on the physics of ultrasound.

This is where Philippe's passion for computing came to the fore. He proposed that we write the book by using a computer. In 1983, we both bought IBM personal computers, and to operate faster, we each invested \$5000 for five megabytes of hard drive—believe it or not, there was such a time. Our savings went into the cutting-edge technology of the era, and we were so confident that we did not print any drafts of our manuscript. We were well over halfway through writing the book when Philippe went to clean some floppy disk by using the MS DOS 1.0 command “Del *.*.” Unfortunately, he was logged in to the hard drive instead of the floppy drive, and those few keystrokes wiped our only copy of the book. It was a setback, but we were not prepared to give up. We started again, and more than half of the book had to be rewritten. There were no utilities at the time, and yes, we kept hard copies henceforth (Figure 4).¹⁶

We learned an important lesson, of course: back up your work. The event also contributed to Philippe's fast-developing computer knowledge. He was the founder of the micro-computer group at Yale. We had a gigantic computer center with mainframe computers with tape. Eventually, Philippe sealed his move to digital by converting his thousands of slides and involved his children in throwing away the originals. He would usually sit with several screens while working, and he quickly embraced digital technology, particularly video, in his teaching, which included advanced programs such as Director.

The Birth of Perineal Scanning

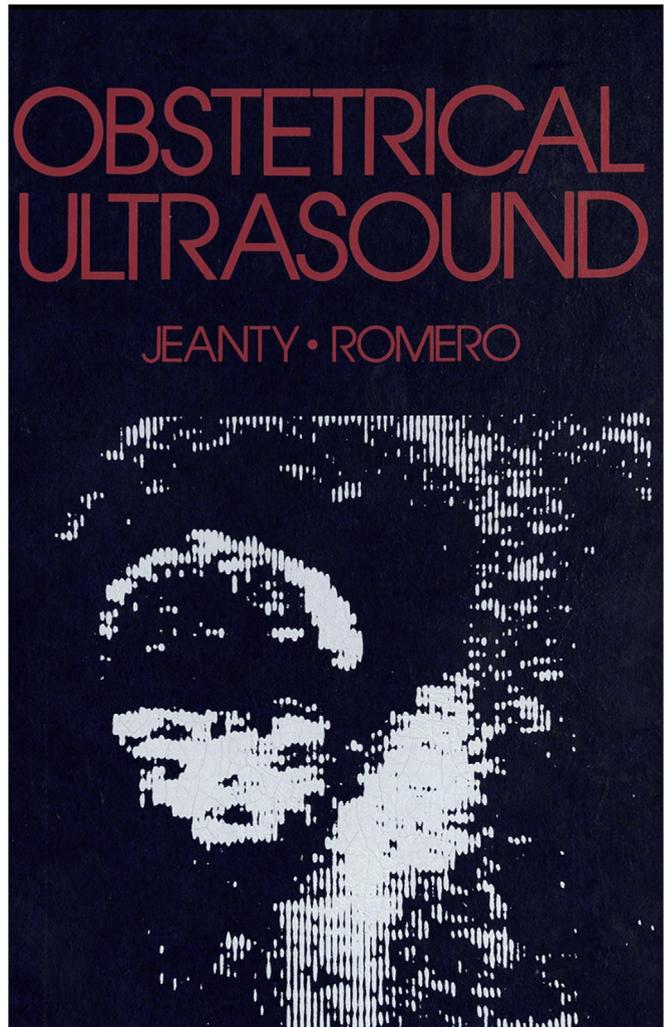
Philippe had moved to the United States with his then girlfriend, fellow physician-scientist Dr Dominique Delbeke, and they married shortly after they arrived in Connecticut. When Dominique became pregnant, I was her obstetrician. We encountered a problem during her pregnancy—by using transabdominal ultrasound, we were not sure whether she was presenting placenta previa. We performed several scans, but diagnostic uncertainty remained. Philippe came up with the idea to scan with the transducer on the perineum, which had not been done before.¹⁷ It provided enough detail that we could rule out placenta previa. This approach—an innovation out of frustration—has now become popular, and it is an important part of intrapartum sonography. Philippe and Dominique's daughter Cerine was born in 1983, and their son, Cedric, in 1986.

A Move to Vanderbilt University in Nashville, Tennessee

After his years at Yale, Philippe took a residency position at Vanderbilt University and then moved his family to Fairview, Tennessee. He bought a farm and designed and built a house there—an ecofriendly house with solar panels. Years later, he would design and build another house on a farm with his second wife, Thao. In addition to being an excellent physician, Philippe was a talented architect, carpenter, and farmer—possessing a range of hands-on skills that reflect the practicality running through his imaging work.

FIGURE 4

Jeanty/Romero—obstetrical ultrasound

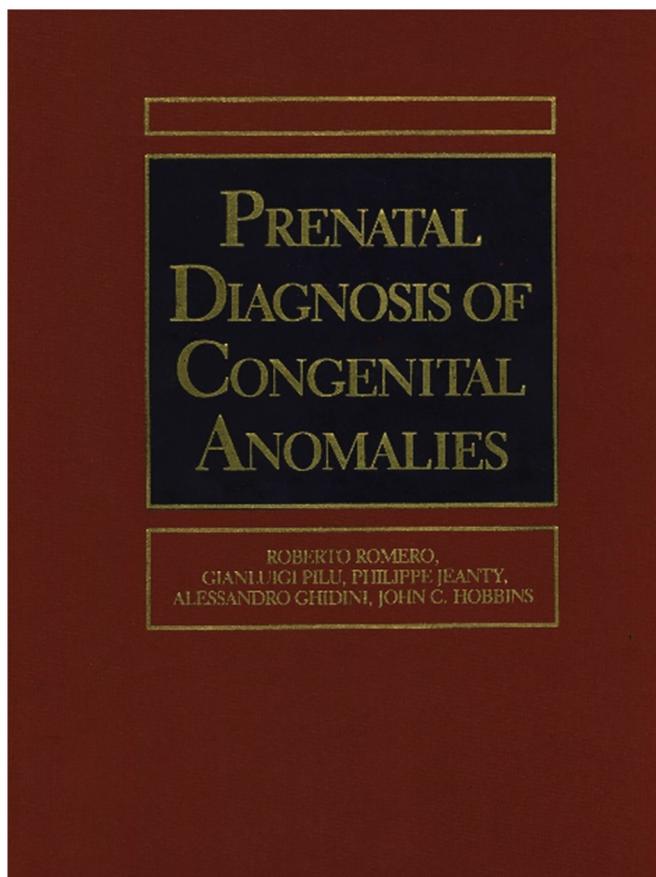


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The Prenatal Diagnosis of Congenital Anomalies

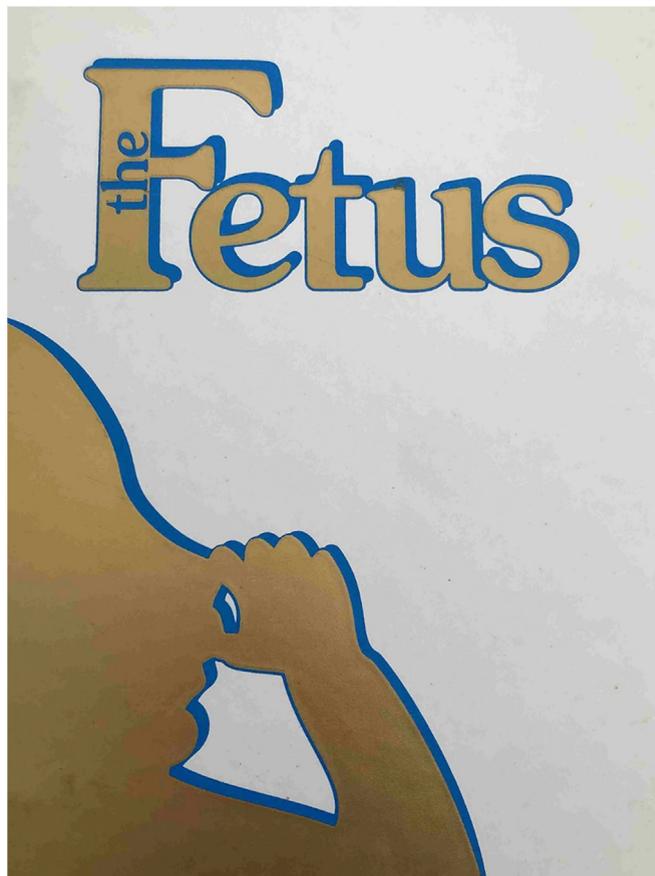
At Yale, Philippe and I had also become good friends with Dr Gianluigi Pilu, who fulfilled a Fellowship in Maternal-Fetal Medicine there.^{18–21} In 1987, the three of us and Dr Hobbins authored the book *Prenatal Diagnosis of Congenital Anomalies*—“the red book”—that sold at least 150,000 copies (Figure 5).²² It brought together what was known at the time and identified the frontiers in which we needed to advance. The book remained in its first edition, in no small part owing to Philippe's principles: the images we used in the book were largely our own, so when we came to discuss a second edition, Philippe defended our rights to the images by demanding that we retain the copyright. This was effectively open access, long before it became common. The publisher never agreed to this, so the book was never re-released. After 15 years, when the book emerged from its copyright, Philippe posted it free online; it has been downloaded several million times since.

FIGURE 5
Prenatal diagnosis of congenital anomalies



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FIGURE 6
The Fetus journal cover



The journal evolved into a website, <https://thefetus.net/>.

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Teaching Obstetrical Ultrasound Around the World

After we published the “red book,” we organized a course on the same subject, held at ClubMed in Sonora Bay, Mexico. For one week, participants attended lectures in the morning, spent the afternoon enjoying the location, and then returned to the conference in the evening. It was highly successful, and we went on to hold the meeting every two or three years at different locations, including New York, Chicago, Nashville, and Cairo. It was a steady event in the calendar that reunited Philippe with Dr Pilu and me.

The Fetus and TheFetus.net

There were several other books for which Philippe was an author and/or editor,^{23–25} and he contributed to no less than 30 books and quarterly publications: he had boundless energy and ambition. He also produced a key publication of case studies, which are very important in medicine, including ultrasound. The journal *The Fetus* contained case studies in loose-leaf format, making them more usable (Figure 6). Philippe and I were founding Editors-in-Chief, and Philippe was passionate about this endeavor.

Managing a print publication became impractical, and since technology allowed, Philippe took it online as <https://thefetus.net/>. This platform enabled him to provide the content more easily, to more people. What’s more, in line with his values around access and equality, he could provide high-quality content free of charge, in a space where others were charging thousands. The website became the largest on prenatal diagnosis by ultrasound, featuring 20,000 images, 600 videos, and 2700 articles. He spent a few hours a day personally maintaining the site, and he frequently worked on its content into the middle of the night.

The website, <https://thefetus.net/>, is an expression of his desire to share information and to learn from others. In addition to connecting with countless physicians through the weekly case study he featured and diagnosed, Philippe recruited colleagues around the world to work on the site.

His commitment to and passion for education earned him the 2020 Stuart Campbell Award for Education. Dr Alfred Abuhamad made possible this recognition. Yet, Philippe’s response showed his humility: he tried to decline the nomination and award, as he considered himself “too old” and

FIGURE 7

Philippe performing ultrasoundRomero. Philippe Jeanty, MD, PhD. *Am J Obstet Gynecol* 2021.

undeserving of awards, which he did not consider important in his life.

Philippe's Personality and Dress Code

As a physician, Philippe supported his patients in a unique way, caring for their health and, much more widely, in their lives (Figure 7). He provided to his patients his personal cell phone number and told them they could call any time—day, night, and weekend. His philosophy was that patients could count on him, and he told me that this privilege was never abused. Those of us fortunate enough to work with him were inspired by his intelligence, practical outlook, and desire to make a difference in the world. In addition to being a gifted physician, Philippe was an unforgettable character—a person who was larger than life. He had a memorable dress code; people were known to identify him by a “white shirt with an X on the back,” given his penchant for suspenders (which he would pair with clogs to finish the look) (Figure 8). In summing up his gift of versatility, Philippe was a computer visionary, an architect, an engineer, a builder, a farmer, a photographer, an artist, an inspiration, and a friend.

Open Door, Open Mind

Philippe welcomed people into his life and home with open arms. The property he owned with Thao became the base for many events, including a regular course on fetal echocardiography, which famously featured a pig heart dissection in the river.

“The river that runs in our farm has a wonderful large rock that makes it easy to do pig heart dissection without making a mess,” Philippe wrote. “After the dissections, the hearts were cut up as fish food. Although at first there is an ‘eww’ factor, everyone eventually joined in!”

I write this piece not only with respect and admiration but also from the perspective of a close friend since we first met almost 40 years ago. When Philippe passed away on November

FIGURE 8

Philippe in signature suspenders

Photographed in Melbourne, Australia, during an ISUOG World Congress.

ISUOG, International Society of Ultrasound in Obstetrics and Gynecology.

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25, 2020, we lost a visionary physician-scientist, a teacher, and a man of great empathy, compassion, and humility. Although I am sure he would insist he was undeserving of being named a “Giant in Obstetrics and Gynecology,” Dr Philippe Jeanty is recognized as such for his pioneering contributions to obstetric and gynecologic ultrasound and as one of the greatest medical educators of recent decades.

ACKNOWLEDGMENTS

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