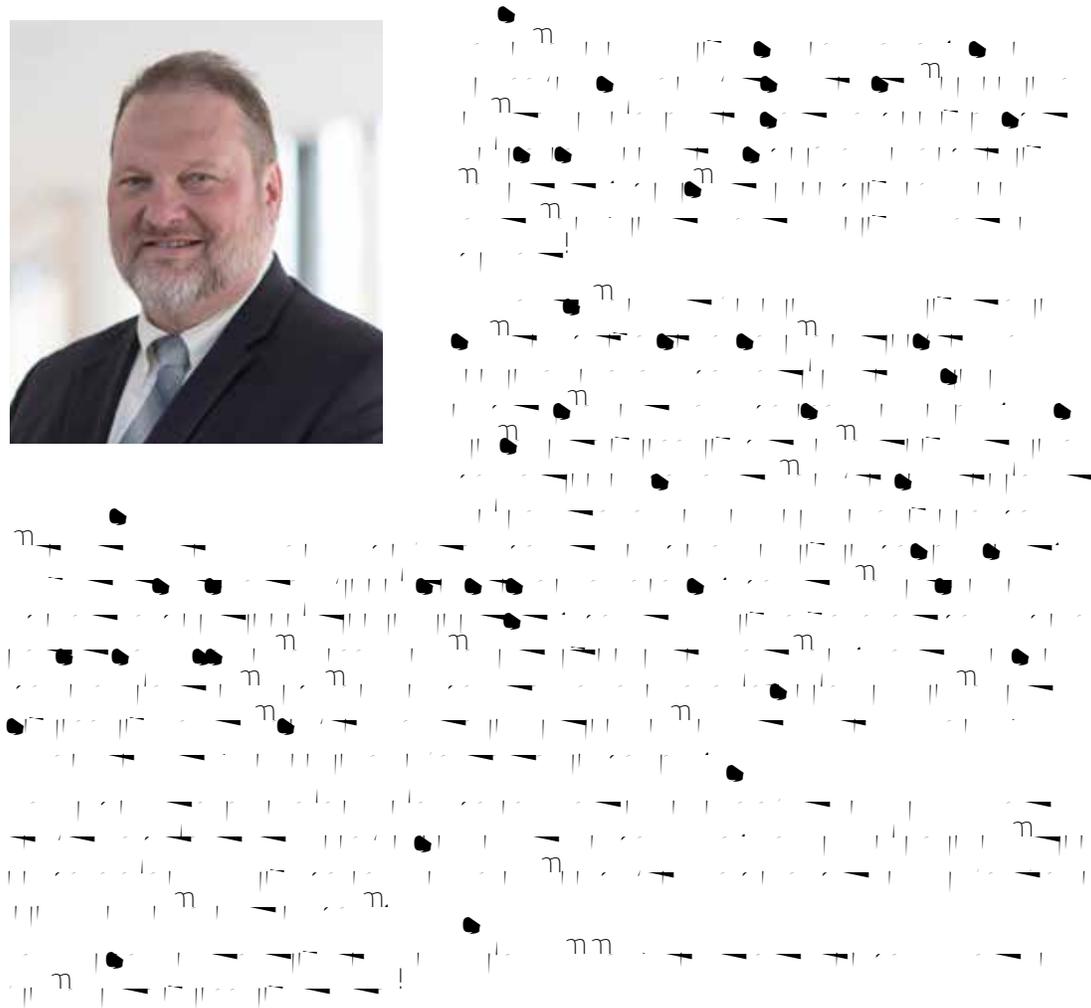




Handwritten musical notation on a five-line staff. The notation consists of several measures of music, featuring vertical stems and horizontal beams. There are several black dots placed above the staff, likely indicating specific notes or rests. The notation is somewhat faint and appears to be a sketch or a preliminary draft.

FROM THE CHAIR



A handwritten signature in black ink that reads "Robert F. Kirsch". The signature is written in a cursive style and is positioned above a thin horizontal line.

Robert F. Kirsch

funding from

>50 institutions
i/ 12

Steve Fening



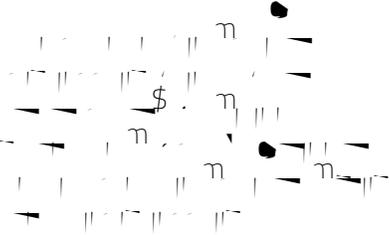
Colin Drummond



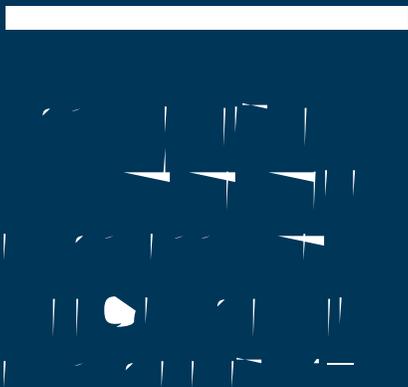
**Bolu Ajiboye and
Jeffrey Capadona**



Xin Yu



FOR COMPUTATIONAL IMAGING RESEARCH



— Anant Madabhushi

NEARLY
\$9
MILLION
2018

9
PROJECTS

6
FUNDING
AGENCIES



Last fall's issue of the Biomedical Engineering Department's newsletter included a profile of the Center for Computational Imaging and Personalized Diagnostics (CCIPD) directed by Anant Madabhushi, the F. Alex Nason Professor II of Biomedical Engineering at Case Western Reserve University. The overarching goal of

the CCIPD is to extract as much value as possible from medical imaging scans to predict disease presence, prognosis and treatment response in order to facilitate patient management and appropriate therapy.

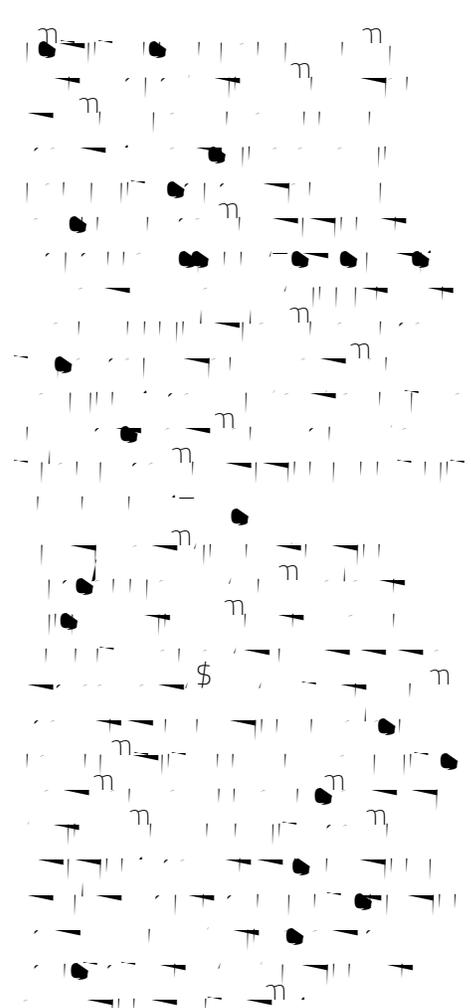
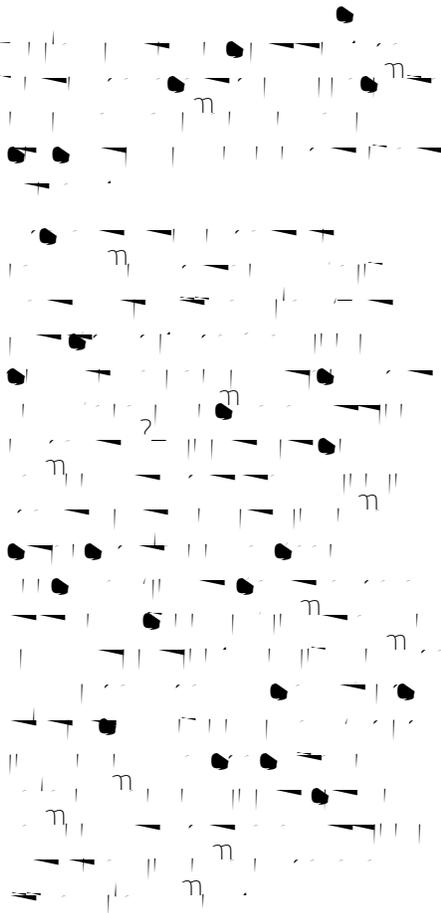
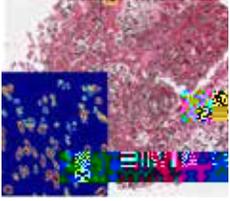
Between 2015 and 2017, the CCIPD received more than \$13 million in total funding. That figure has since

grown almost 70 percent, with the center receiving nearly \$9 million in funding so far in 2018. "What is so exciting about this funding is that it's a recognition that you need decision support tools to complement and augment human decision-making. These tools are meant to empower pathologists, radiologists and oncologists, not obviate them," says Madabhushi. "The funding is truly a validation of the need and utility of this kind of technology."

The CCIPD focuses on four broad subject areas: image guided interventions, digital pathology, machine learning and personalized medicine, and computational diagnostics. The center's most recent awards touch upon all these areas.

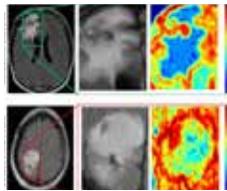
Lung Cancer Risk Stratification

National Cancer Institute



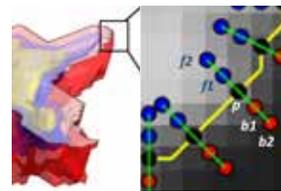
Predicting Treatment Response for Brain Tumors

Congressionally Directed Medical Research Program (CDMRP)



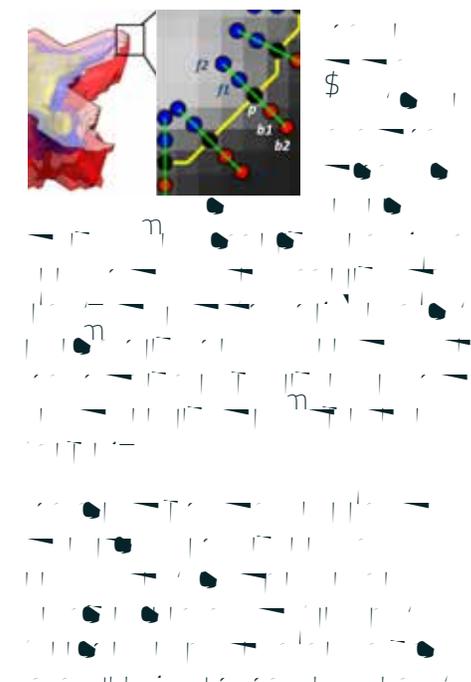
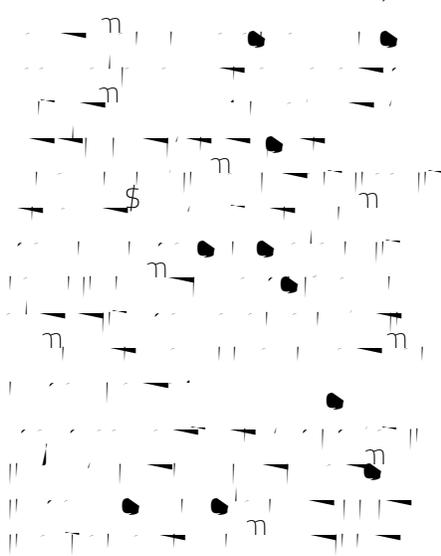
Lung Cancer Screening

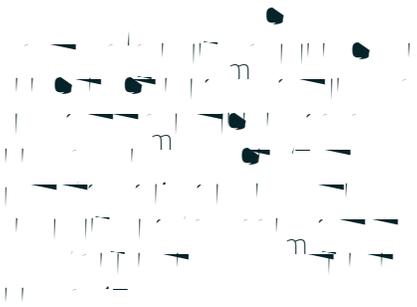
Congressionally Directed Medical Research Program (CDMRP)



Risk Stratification of Head and Neck Cancers

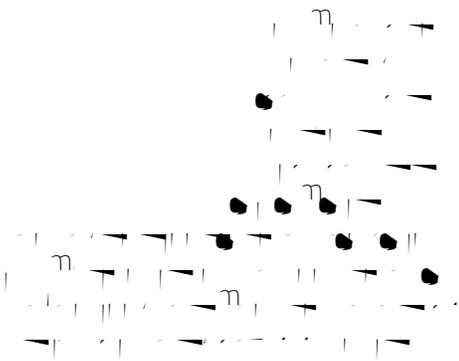
National Cancer Institute



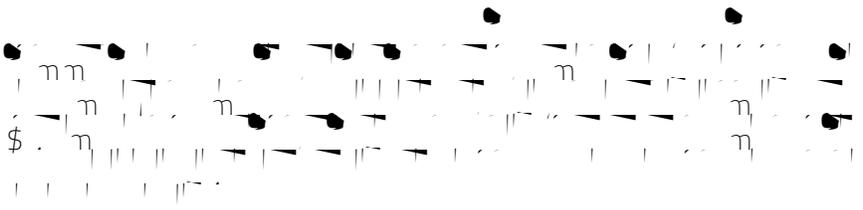


Breast Cancer Project

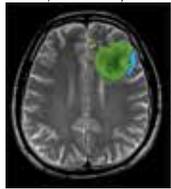
*United States – India Science and
Technology Endowment Fund*



INNOVATIONS RECEIVE FUNDING BOOST FROM CASE-COULTER TRANSLATIONAL RESEARCH PARTNERSHIP



Neurological research leads to new brain imaging techniques



Research leads: Susann Brady-Kalnay, professor of molecular biology and microbiology; James Basilion, professor of radiology and biomedical engineering; and Andrew Sloan, professor of neurosurgery.

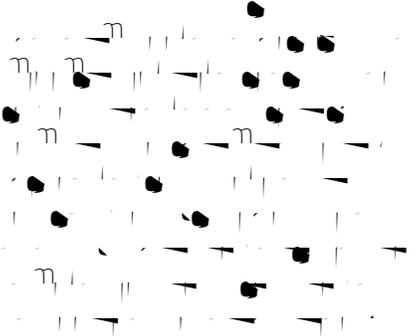


Medical research leads to improved surgical techniques



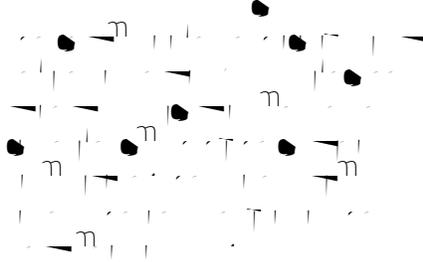
Research leads: Tina Vrabec, research assistant professor; Elias Veizi, assistant professor of anesthesiology and perioperative medicine; Niloy

Bhadra, research assistant professor of biomedical engineering; Jesse Wainright, research professor of chemical engineering.



Optical research leads to new imaging techniques

Research leads: Dominique Durand, the Elmer Lincoln Lindseth Professor in Biomedical Engineering; and Kingman Strohl, professor of physiology and biophysics.

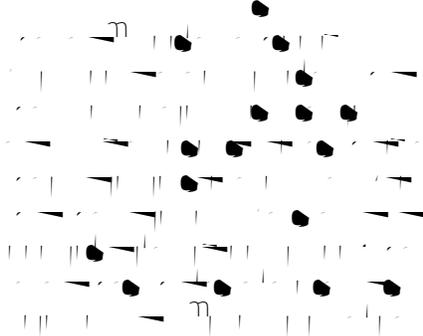


Plant research leads to improved crop yields

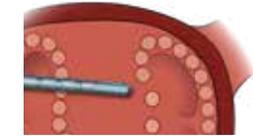


Research leads: Aaron Weinberg, associate dean for research, chair of the Department of Biological Sciences and professor; Umut Gurkan, assistant professor of mechanical and aerospace

engineering; and Santosh Ghosh, senior research associate.

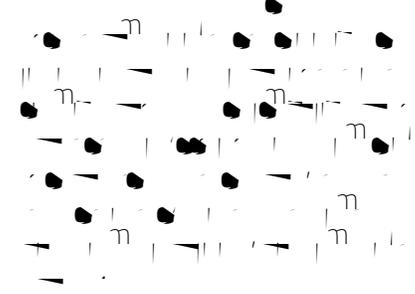


Optical research leads to new imaging techniques



Research leads: Andrew Rollins, professor of biomedical engineering and medicine;

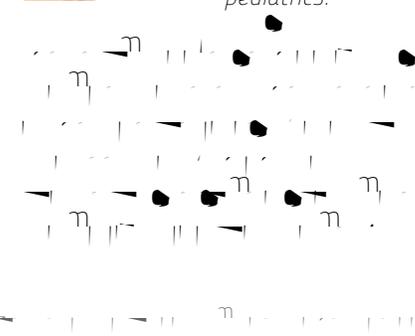
and Mauricio Arruda, associate professor of medicine.



Plant research leads to improved crop yields



Research leads: Miklos Gratzl, associate professor of biomedical engineering; and James Chmiel, associate professor of pediatrics.



ON A MISSION TO SAVE LIVES

Researchers are fighting to save patients with the creation of synthetic blood platelets that promote hemostasis and healing.

Handwritten musical notation on a staff. The staff consists of five horizontal lines. The notation includes several black dots representing notes, some of which are connected by short horizontal lines. There are also several lowercase 'm' characters scattered across the staff, some positioned above and some below the lines. The overall appearance is that of a rough sketch or a preliminary draft of a musical score.

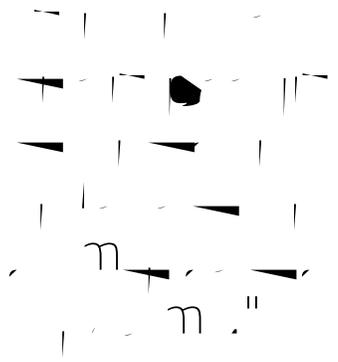
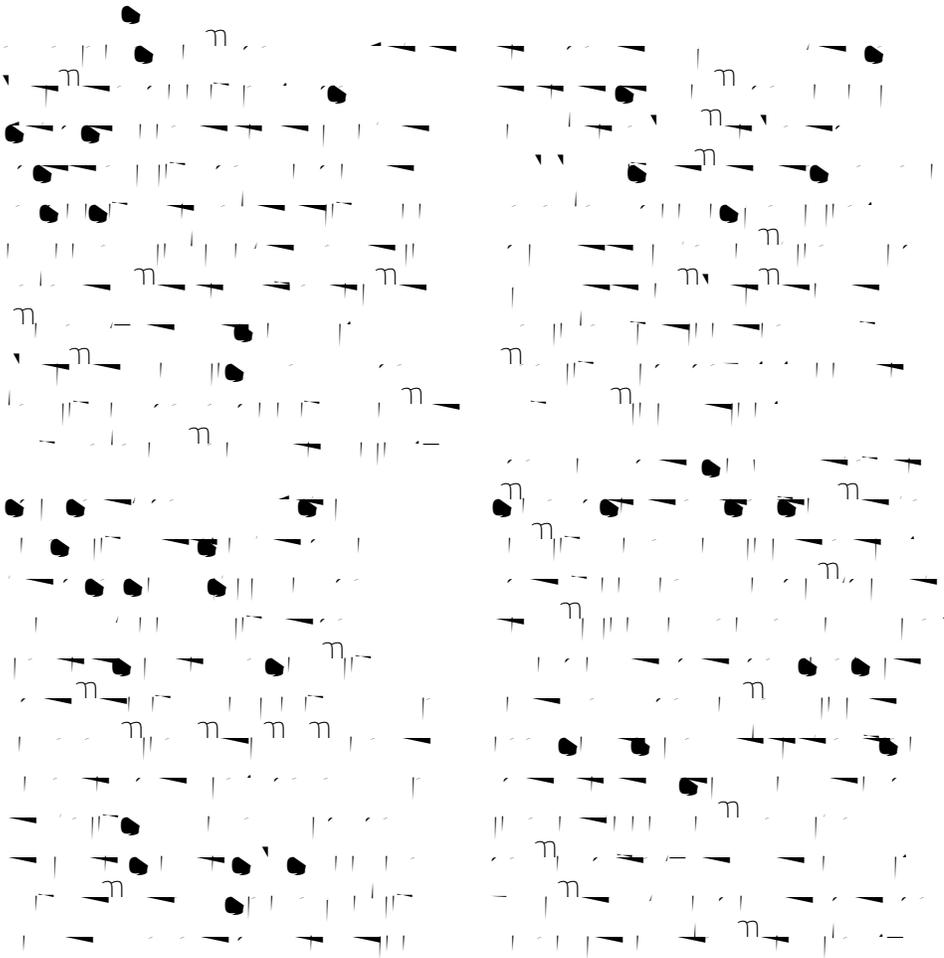
Handwritten musical notation on a staff, similar to the first block. It features five horizontal lines with black dots and short horizontal lines representing notes. Lowercase 'm' characters are interspersed throughout the staff. The notation is somewhat sparse and appears to be a continuation or a separate section of the musical sketch.

A musical staff with a treble clef. It contains several measures of music. The notes are mostly quarter notes and eighth notes, with some rests. There are some markings that look like 'm' or 'n' below the notes, possibly indicating fingerings or breath marks. The staff is oriented vertically on the page.

A musical staff with a treble clef. It contains several measures of music. The notes are mostly quarter notes and eighth notes, with some rests. There are some markings that look like 'm' or 'n' below the notes, possibly indicating fingerings or breath marks. The staff is oriented vertically on the page.

Tai I... a
y I Na...

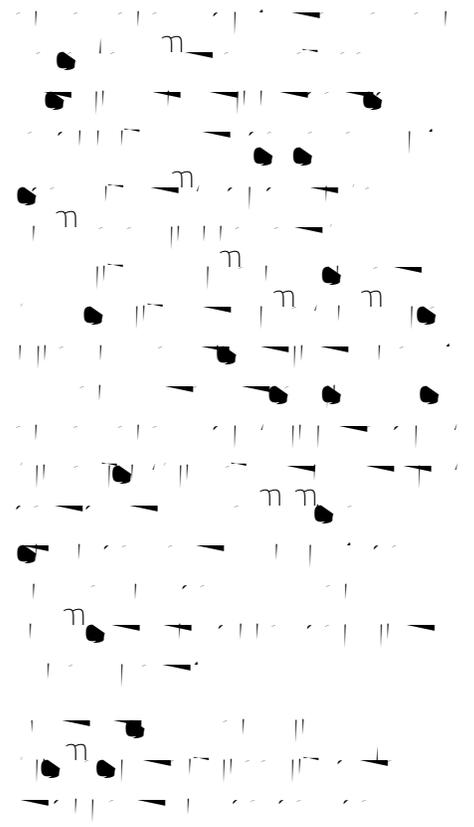
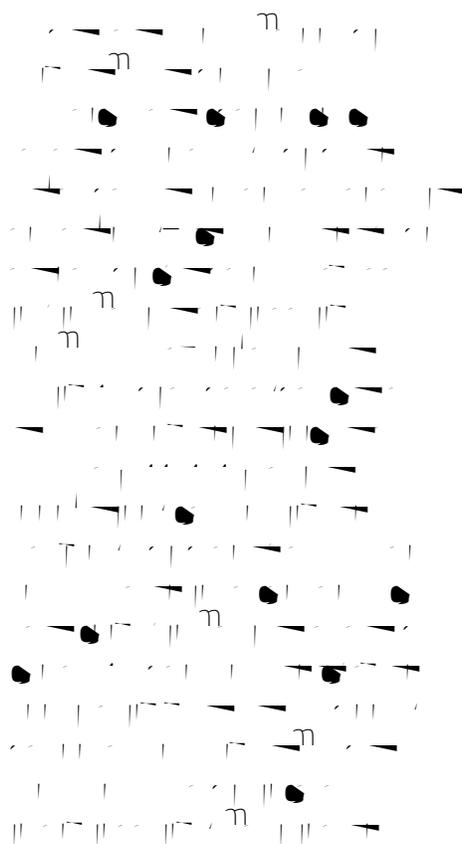
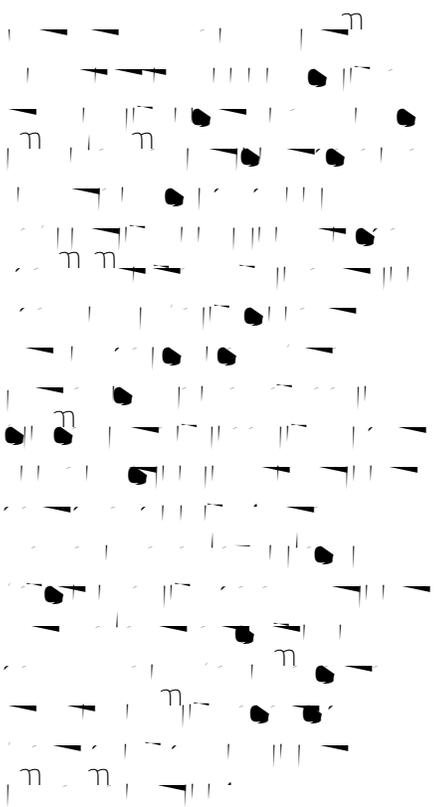
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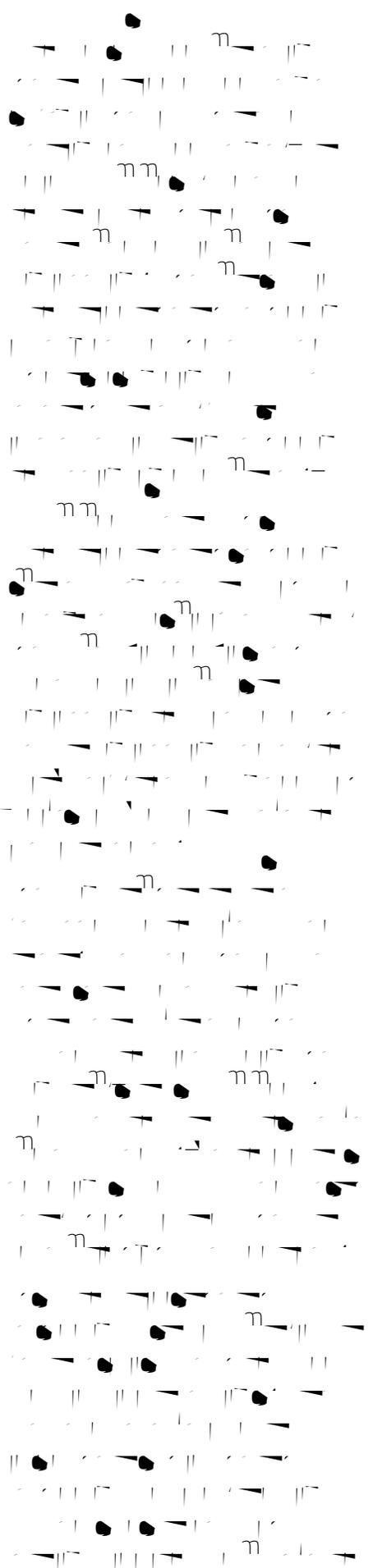


— Christa Pawlowski

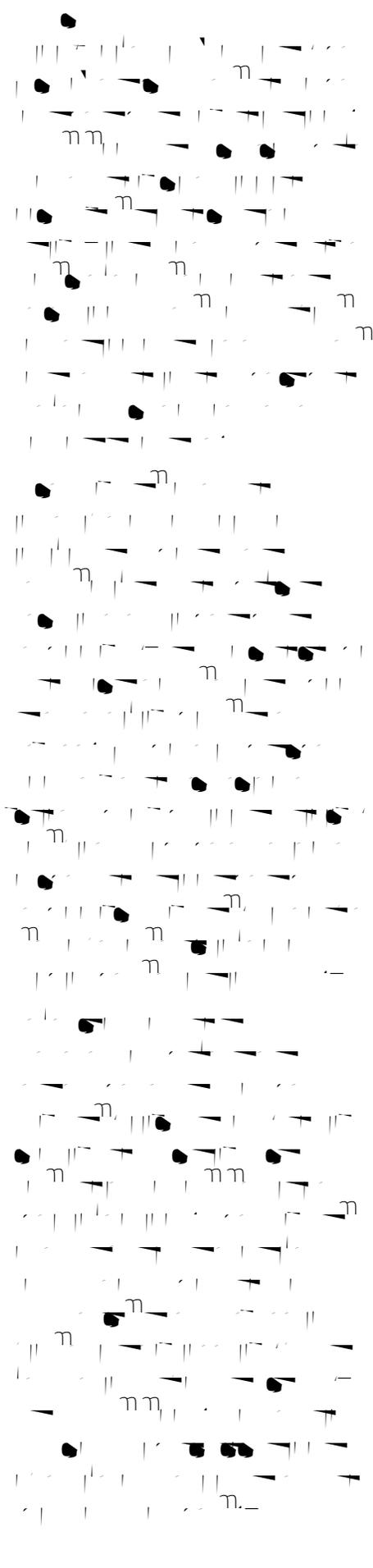


The master's track in translational health technology helps students convert research ideas into commercial success.

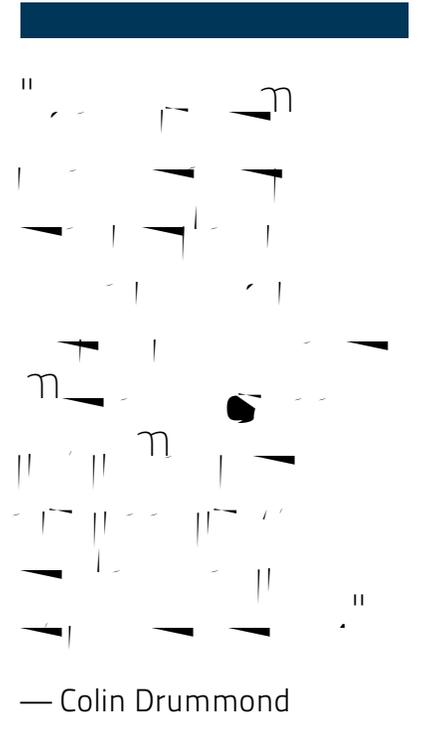




Musical score system 1, featuring a series of staves with notes and rests.



Musical score system 2, featuring a series of staves with notes and rests.



Musical score system 3, featuring a series of staves with notes and rests.

— Colin Drummond

ALUMNI HIGHLIGHTS

Luis Solorio



CASE

l a