HUMBLE VENTURES · OPEN SOURCE CASES

humblecase · lab case · 2026

Ullah Lab

Principal Investigator · Hemayet Ullah
Howard University



RESEARCH STORY

GOLDEN CIRCLES

RESEARCH LEAN CANVAS

ABOUT THIS CASE

Welcome to the open-source case for Ullah Lab. Hemayet Ullah's story is worth the telling because of its throughline: a plant-science student who left the University of Dhaka for an MS at NC State and a PhD at UNC Chapel Hill has built a career on a single, stubborn question — how a cell's signalling hubs decide when to grow and how to withstand stress — and followed it from plant G proteins to their structural cousin RACK1. At Howard University, his lab is where that question lives now, probing how these hubs integrate growth and stress signals and whether molecules aimed at them can tune outcomes in crops, viral infection and cancer, all while bringing students into science.

THREE LENSES

- **Research Story** traces how this PI and his central question came to be.
- **Golden Circle** sets out why he does the work, how, and what it has produced — including the finding that the G-protein alpha subunit GPA1 positively modulates cell division (Science, 2001).
- **Research Lean Canvas** grounds it in a tangible problem, crops failing in salty soil, and the rice growers on salt-affected land who carry it.

IN ONE LINE

Hemayet Ullah has followed one question, how a cell's signalling hubs decide growth and stress, from plant G proteins at UNC to RACK1 at Howard, carrying it into crops, viruses and cancer, and into his students' research.

The PI · Research Story

1

Plant roots

From Dhaka to North Carolina, a plant-science student earned an MS at NC State and a PhD at UNC Chapel Hill.

2

How cells read signals

In Alan Jones's lab he traced how plant cells use G proteins to drive division, germination and water-controlling guard cells.

3

A turn to RACK1

At Howard from 2004 he took up RACK1, a G-beta lookalike, and solved the first crystal structure of any RACK1.

4

Mapping what RACK1 does

He charted its contacts and phosphorylation switch, and showed it steers salt tolerance and keeps rice leaves green.

5

Drugging the hotspot

With Georgetown he designed molecules for RACK1's working spot, tuning roots and blocking herpes in cells; joint patents 2023-2026.

6

Same logic, new foes

Preprints applied the approach to coronavirus with a DNA strand and CRISPR strip, then to HIV-1 and breast-cancer cells.

7

Bringing students in

Alongside the science he mentors undergrads through phage genomics, teaching tools and an exhibit on Black plant scientists.

ONCE UPON A TIME...



1 A plant-science student from the University of Dhaka, Bangladesh, came to North Carolina for an MS at NC State and then a PhD at UNC Chapel Hill.

EVERY DAY...



2 In Alan Jones's group, Hemayet Ullah asked how plant cells read signals through G proteins. He showed that the alpha subunit drives cell division, the beta subunit reins in auxin-triggered division, and the pathway shapes seed germination and the guard cells that control water loss. That first-author work appeared in Science, Plant Physiology and The Plant Cell.

UNTIL ONE DAY...



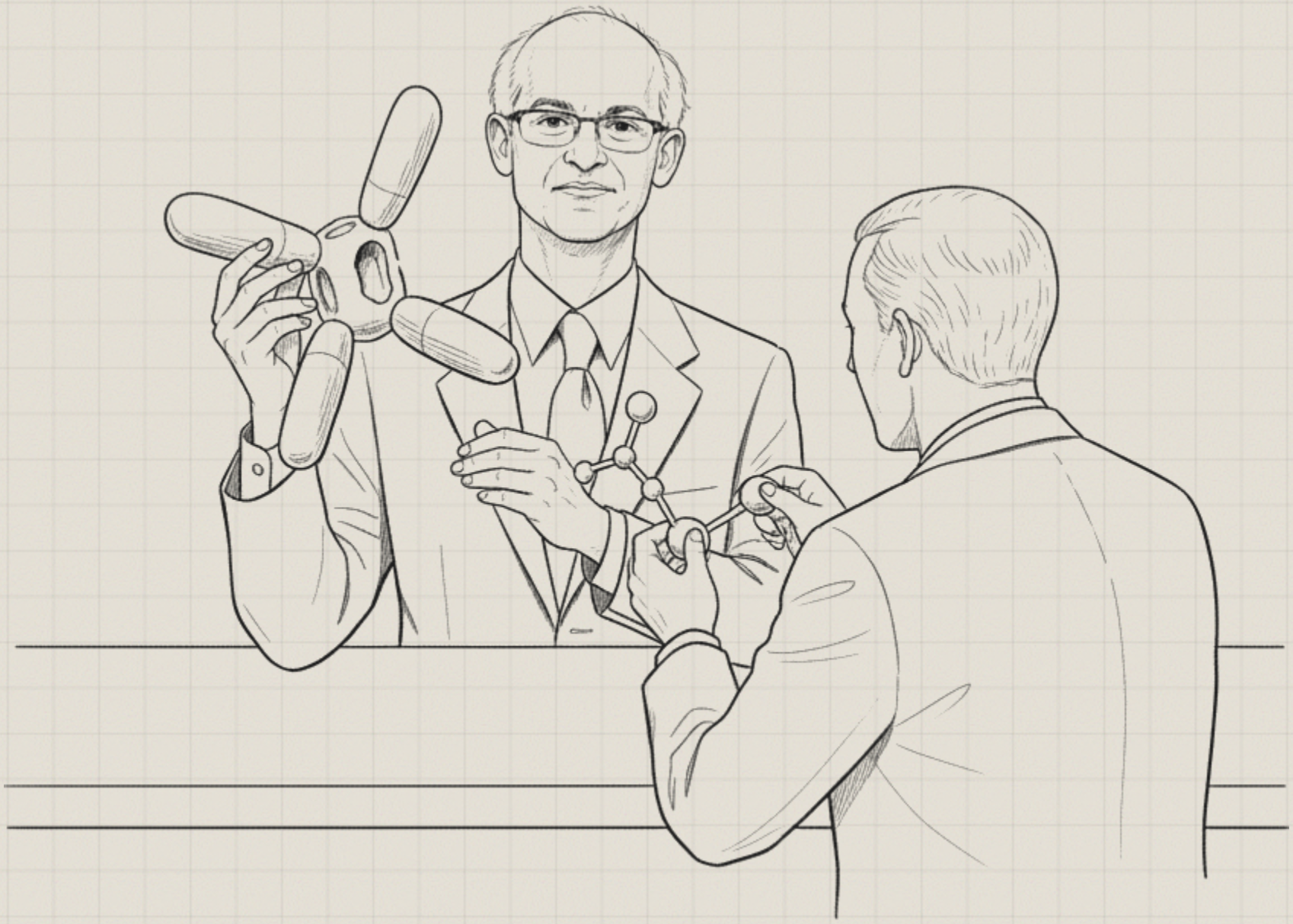
3 After a postdoc at the NIH's environmental health institute, he joined Howard University in 2004 and turned to RACK1, a protein built like the G-protein beta subunit he had studied. He solved the first crystal structure of any RACK1 protein.

BECAUSE OF THAT...



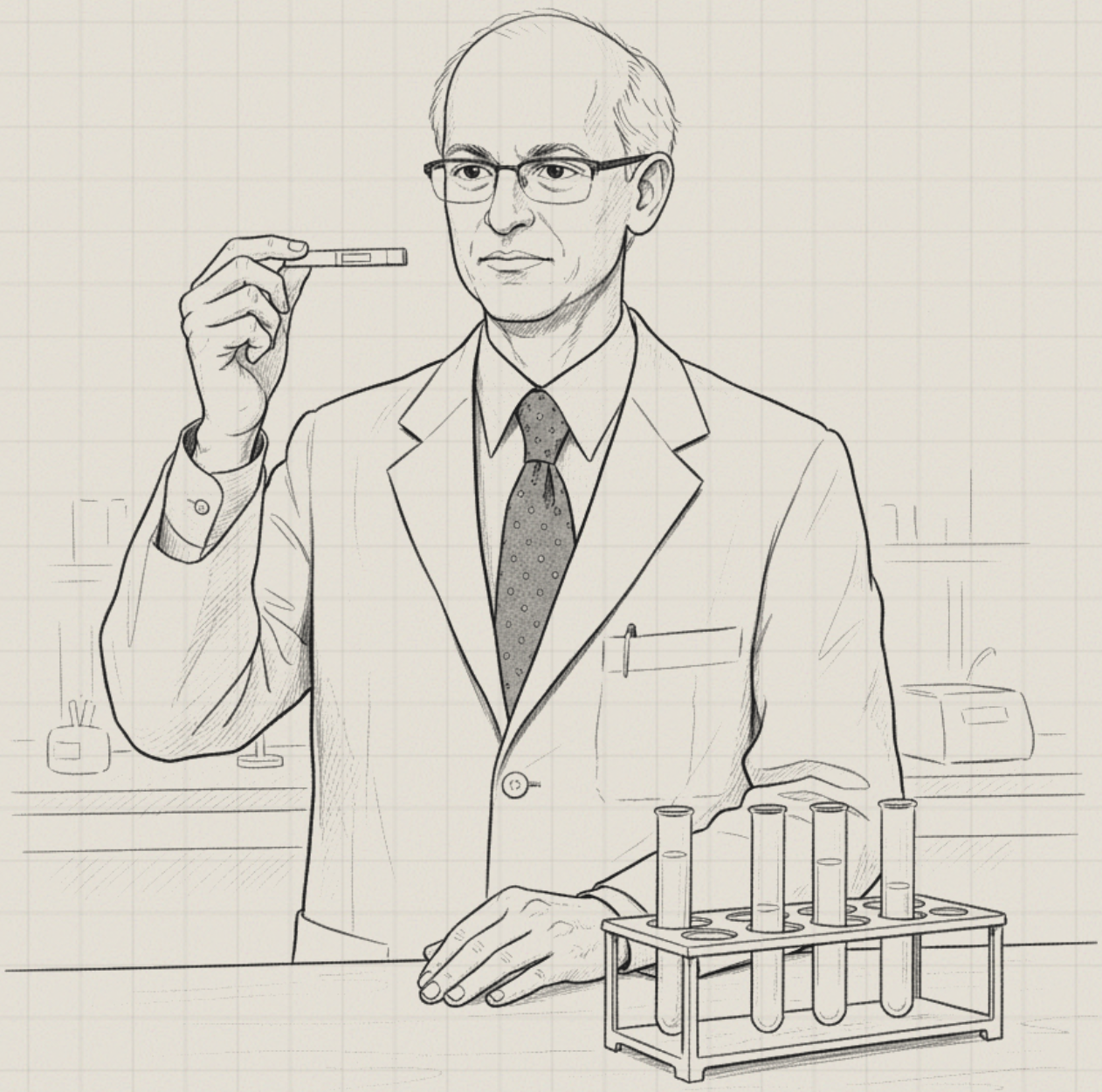
4 Next he mapped what RACK1 touches and how phosphorylation switches it on, and showed that it shapes salt tolerance in Arabidopsis and keeps rice leaves green under salt.

BECAUSE OF THAT...



5 With Georgetown's Sivanesan Dakshanamurthy he designed small molecules against the structure's working spot. In plants they tuned root growth. In lab-grown cells (not yet in patients) they held back herpes simplex virus, which, like many viruses, borrows RACK1 to make its proteins. The partnership has produced jointly assigned Howard–Georgetown patents, granted from 2023 to 2026.

BECAUSE OF THAT...



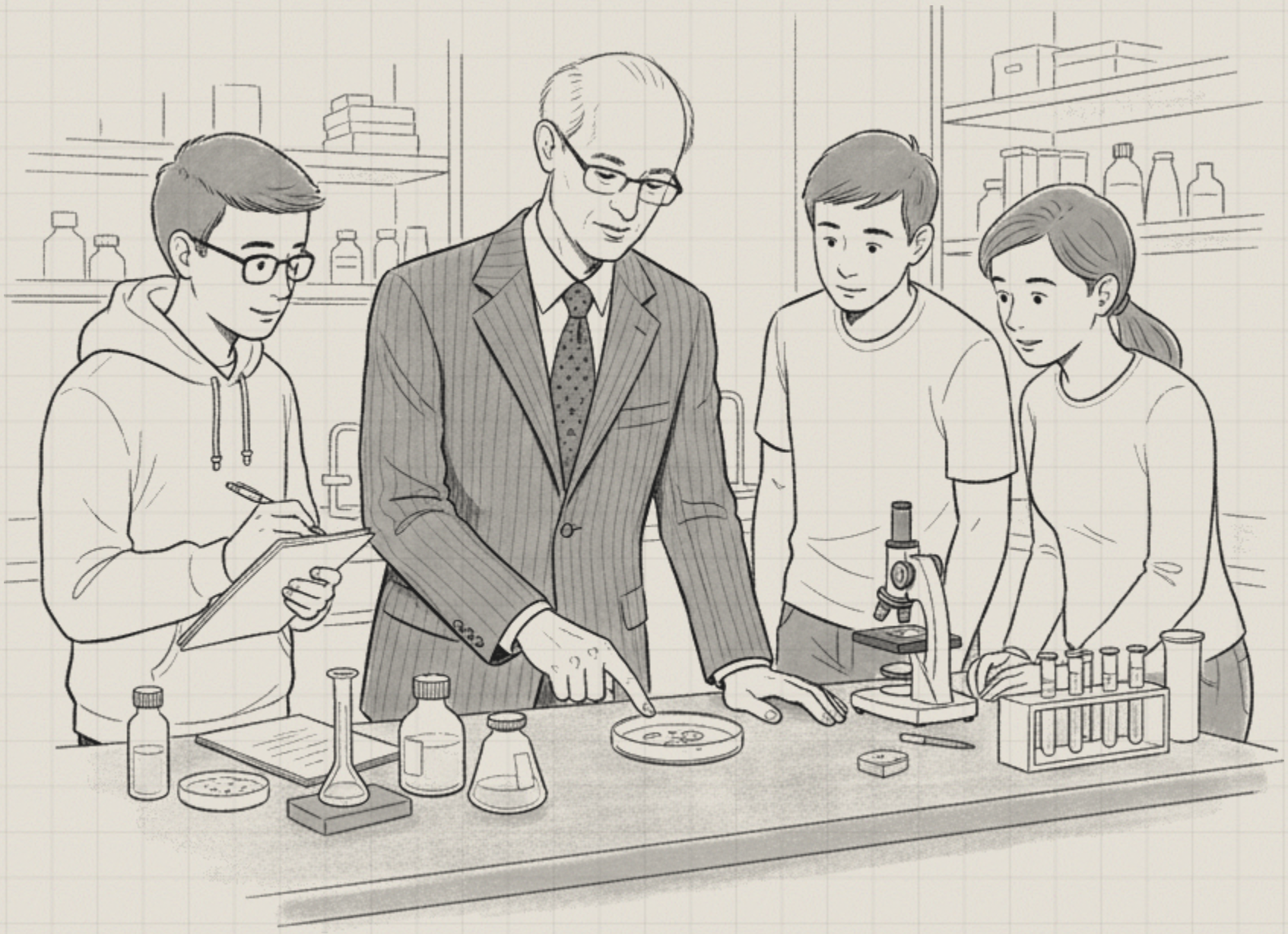
6 When COVID-19 arrived he applied the same logic to the coronavirus: a designed DNA strand aimed at a stretch of its RNA that new variants keep, and, with Princeton's Cameron Myhrvold, a CRISPR test strip that picks up only actively replicating virus. Both are preprints.

UNTIL FINALLY...



7 He has carried the same RACK1 compounds into new targets: HIV-1 in infected cells, and spreading breast-cancer cells. Both results are preprints.

EVER SINCE THEN...



8 Alongside the science he brings students in: phage genome papers co-authored with undergraduates, a national genomics research course, genome-editing teaching tools, and an exhibit honouring pioneering Black plant scientists.

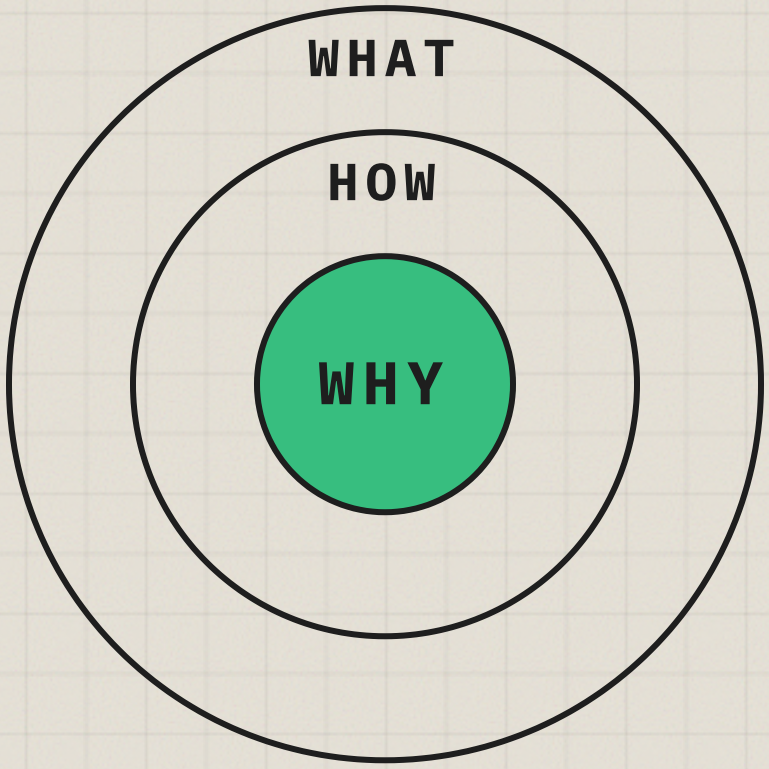
AND THE MORAL OF THE STORY IS...



9 A question about how a small weed's cells pass signals can lead, over one career, to new ways of fighting viruses: aim at what the invader depends on, not at the invader.

The Lab · Golden Circle

Start with why.



WHY	**Hemayet Ullah has spent his career on one question: how a cell's signalling hubs decide when to grow and how to withstand stress.**
HOW	He follows one family of proteins wherever it leads: from G proteins in his PhD to RACK1, its structural cousin.
WHAT	Papers that shaped plant G-protein biology (two in Science, plus Plant Physiology and The Plant Cell); the first RACK1 crystal structure; salt-tolerance…

Keeping crops alive in salty soil

Salty soil makes rice leaves yellow early and cuts harvests, a problem that grows as the climate changes. Ullah studies RACK1, a protein that works like a switchboard for a plant's stress and growth signals. In rice, boosting RACK1B kept leaves green under salt by slowing chlorophyll breakdown; in Arabidopsis, losing RACK1A left plants salt-sensitive. He has also made small molecules that turn the switchboard up or down; one boosted root growth and could become a root-inducing bio-stimulant for growers.

Stopping viruses that hijack our cells

Many viruses copy themselves by borrowing a protein from the cells they infect, RACK1, to read their own genetic instructions. Ullah solved the first 3D structure of a RACK1 protein and, with Georgetown chemists, designed small molecules that fit its working spot. In lab-grown cells they stopped herpes simplex virus about as well as the standard drug acyclovir, and worked better alongside it. In a later preprint, the same compounds cut HIV-1 and hepatitis C reporter activity and reduced HIV protein production in infected cells. It is like changing the lock on a tool the burglar needs instead of chasing the burglar: aiming at the host protein rather than the fast-changing virus is why the approach could reach many viruses.

Telling an active infection from leftover virus

Standard COVID tests find the virus's genetic material, but they cannot tell a virus that is still copying itself from harmless leftover fragments, which muddies decisions about quarantine and treatment. A replicating coronavirus makes a mirror-image copy of its RNA (the negative strand), so Ullah proposed testing for that copy instead. With Princeton's Cameron Myhrvold, he prototyped a CRISPR-based paper test strip that detects only replicating coronaviruses. It is like checking whether the stove is still lit rather than whether the pan is warm. Both studies are preprints, not yet peer reviewed.

Hitting a weak spot coronaviruses cannot mutate away

New variants dodge drugs by mutating. Ullah targets a stretch of repeated U letters (the 5′-polyU tract) on the virus's mirror-image strand: the virus needs it, it is conserved across variants, and human cells carry no such tract. In mouse-coronavirus experiments, a short designed DNA strand aimed at that tract prevented virus-induced cell death and stopped infectious virus from forming, while host cells were unaffected. The same tract could also serve as an early marker of infection. These results are preprints from cell experiments.

Slowing cancer that spreads

Some cancers become deadly when tumour cells start moving and invading new tissue, and RACK1 helps drive that movement. In lab tests on two breast-cancer cell lines, Ullah's RACK1 inhibitor compounds (SD29 and SD29-14) stopped the cells growing the protrusions they crawl with and cut their migration and invasion (preprint). He and Georgetown's Sivanesan Dakshanamurthy have a U.S. patent application covering these compounds for cancers in which RACK1 drives cell migration. It is the same switchboard idea again: block the protein the cancer relies on to move.

RESEARCH PROGRAM, CENTRAL QUESTION & CAPABILITIES

1 Ullah's central interest is signal transduction through RACK1 (Receptor for Activated C Kinase 1), a structural homolog of the G-protein beta subunit that acts as a scaffold integrating signals from different pathways; the Ullah Lab at Howard is where he pursues it.

2 Foundation

His doctoral work showed that the Arabidopsis G-protein alpha subunit GPA1 positively modulates cell division, that the beta subunit negatively regulates auxin-induced cell division, and that GPA1 is needed for ABA regulation of guard-cell ion channels.

3 Structure

He solved Arabidopsis RACK1A at 2.4 Å resolution, the first crystal structure of a RACK1 protein, revealing conserved surface residues and likely post-translational modification sites.

4 Interactome

A split-ubiquitin cDNA library screen with RACK1A as bait found 97 potential interacting proteins from dehydration, salt-stress, ribosomal and photosynthesis pathways.

RESEARCH PROGRAM, CENTRAL QUESTION & CAPABILITIES

5 Regulation

RACK1A is tyrosine phosphorylated in response to environmental stresses, and that phosphorylation can dictate homo-dimerization, which plays a role in UV-B-induced oxidative stress resistance.

6 Hormones and stress

RACK1A is implicated in D-allose-mediated inhibition of seed germination and in miR393-regulated salt stress responses linking ABA and auxin signaling.

7 Small-molecule modulation

Compounds targeting the RACK1A Tyr248 functional site either stabilize (SD29-12) or inhibit (SD29, SD29-14) auxin-induced phosphorylation, which changes lateral root formation.

8 Crops

In rice, OsRACK1B overexpression impairs fertility through NADPH-dependent H2O2 accumulation, and it delays salinity-induced leaf senescence by regulating chlorophyll degradation, including through an interaction with the STAY-GREEN protein.

RESEARCH PROGRAM, CENTRAL QUESTION & CAPABILITIES

9 Host-targeted antivirals

Structure-based drug design against the RACK1A crystal structure produced compounds that bind recombinant RACK1A and inhibit HSV-1 proliferation in HEp-2 cells; a preprint reports the same compounds inhibiting HIV-1 and HCV IRES activity.

10 Coronavirus diagnostics

He proposes strand-specific tests that detect negative-sense RNA, made only during active replication, and prototyped a CRISPR-based lateral flow assay for replicating coronaviruses (preprints).

11 Coronavirus antivirals

A DNA oligonucleotide with 3′ polyAs, designed against the 5′-polyU tract of the antigenome, prevented cell death and infectious virion production in mouse coronavirus (MHV-A59) experiments (preprints).

12 Cancer

RACK1 Y246 phosphorylation inhibitors (SD29, SD29-14) inhibited migration and invasion of MCF7 and MDA-MB-231 breast-cancer cells, through a mechanism involving focal adhesion kinase (preprint).

RESEARCH PROGRAM, CENTRAL QUESTION & CAPABILITIES

13 **Genome editing**

He co-authored a 2015 review on CRISPR-mediated genome editing with Howard colleagues, and a 2025 paper on the RUBY reporter for teaching genome editing.

14 His interests also reach into other human-health and environmental questions: a co-authored Zika virus–host study led from Howard's College of Medicine, in silico analysis of myeloperoxidase missense mutations, and a 2007 study of PCB dechlorination in the presence of plant nitrate reductase.

FIELD & WHO THE RESEARCH SERVES

1 Crop science

The salinity-senescence work is framed as useful for reducing salt's yield penalty on cereal crops such as rice under climate change.

2 Ag-biotech

The auxin-stimulating compound is described as having potential as a root-inducing bio-stimulant.

3

His lab page describes functional modulators, developed with Georgetown, of a plant protein that negatively regulates environmental stress resistance in crop plants.

4 Antiviral drug development

Because RACK1 is needed for IRES-based translation in many viruses, the compounds are positioned as host-targeted, broad antiviral candidates.

5 Diagnostics and public health

Tests that tell replicating from non-replicating virus are framed as a way to guide quarantine and treatment decisions for SARS-CoV-2 and other single-stranded RNA viruses.

FIELD & WHO THE RESEARCH SERVES

6 Coronavirus therapeutics

The 5′-polyU strategy is framed as a basis for oligonucleotide drugs that could hold up as new coronavirus variants emerge, because the tract is conserved and essential.

7 Oncology

Preprint data show the RACK1 inhibitors limit breast-cancer cell migration and invasion, and a patent application covers the compounds for cancers in which RACK1 positively regulates cell migration.

8 Science education and inclusion

His work includes the NSF-funded ART 21 outreach roadmap, an HBCU exhibit recognizing pioneering Black plant scientists, a RUBY genome-editing tool for teaching, and the Genomics Education Partnership's remote research-course study.

9 Undergraduate research

Ullah is a co-author on Howard SEA-PHAGES papers in which students isolated and sequenced mycobacteriophages from soil.

FUNDING, COLLABORATIONS & WHAT'S AVAILABLE TO PARTNERS

1 His longest-running translational partnership is with Sivanesan Dakshanamurthy of Georgetown University: the RACK1 compounds, the HSV-1, HIV-1 and breast-cancer work, the Tyr248 auxin compounds and the jointly assigned patents.

2 At Howard he works with Qiyi Tang on viruses (Zika, HSV-1, mouse coronavirus) and with Sergei Nekhai on HIV-1; Saadyah Averick co-authored the coronavirus 5′-polyU work.

3 The CRISPR lateral-flow diagnostic was developed with Cameron Myhrvold's group in Princeton University's Department of Chemical and Biological Engineering.

4 Earlier collaborators include Alan Jones and Jin-Gui Chen at UNC Chapel Hill and David Armstrong's Membrane Signaling Group at NIEHS, whose members are also on the RACK1 structure deposit.

5 International collaborators at the Universidad Nacional Autónoma de México co-authored a review of plant RACK1 and an editorial on WD-repeat protein signaling in plants.

FUNDING, COLLABORATIONS & WHAT'S AVAILABLE TO PARTNERS

6 NIH funding acknowledged on his Howard-era papers includes NIMHD, NIAID SC1 AI112785, NCI P30 CA051008 and the NIH intramural program; the HIV-1 preprint also acknowledges the Department of Defense and the DC Center for AIDS Research.

7 National Science Foundation support is acknowledged on the rice RACK1B papers (MCB 0542312) and the 2021 Plant Gene paper (NSF 1036285).

8 HHMI supports the Howard SEA-PHAGES papers, co-authored with Alabama A&M University.

9 Justia lists patents granted to Ullah and Dakshanamurthy, jointly assigned to Howard and Georgetown, with grant dates from March 2023 to July 2026.

WO2004/003146A2 · Expired

PLANT G PROTEINS · 1 EXPIRED FILING

1 What they protect

From his UNC years in Alan Jones's group: an international filing on improving plant traits by altering the activity of the G-protein alpha and beta subunits. It is assigned to UNC Chapel Hill, with Ullah one of eight inventors.

2 What it could make possible PATENT ANALYSIS

Crops tuned for flowering time, seed yield, root growth and plant shape by turning down two signalling genes, GPA1 and AGB1.

US20150119250A1 · Application US20180360043A1 · Application

RACK1 AND PLANT STRESS · 2 APPLICATIONS

1 What they protect

Two applications with Georgetown's Sivanesan Dakshanamurthy, assigned to Howard, on methods for modulating a plant's response to environmental stress.

2 What it could make possible PATENT ANALYSIS

Small molecules that work RACK1A's tyrosine-248 switch to help crops cope with salt, drought and heat, or to leave weeds more vulnerable.

3 Who it serves PATENT ANALYSIS

Growers facing drought and salty soil, and weed management.

US11576901B2 · Granted US11596623B2 · Granted
US12678425B2 · Granted

HOST-TARGETED ANTIVIRALS · 3 GRANTED PATENTS

1 What they protect

Three granted patents with Dakshanamurthy, assigned to Howard, on methods for treating viral infection. The compounds aim at RACK1, a protein in our own cells that many viruses borrow to make their proteins.

2 What they could make possible PATENT ANALYSIS

Antivirals that block the cell protein a virus depends on instead of the virus itself; one pairs the compounds with the standard herpes drugs acyclovir and valacyclovir.

3 Who it serves PATENT ANALYSIS

People with HIV-1, herpes and enterovirus D68 infections; EV-D68 is linked to a polio-like paralysis that mostly affects children.

US20220168277A1 · Application

CANCER SPREAD · 1 APPLICATION

1 What they protect

An application with Dakshanamurthy, assigned to Howard, on compounds against the migration and invasion of cancer cells.

2 What it could make possible PATENT ANALYSIS

Drugs that keep cancer cells from moving and invading by switching off RACK1 at its Y246 site, so far tested in glioblastoma and breast-cancer cells in the lab.

3 Who it serves PATENT ANALYSIS

People with cancers in which RACK1 helps drive the spread.

US20230183703A1 · Application US20260209766A1 · Application

THE CORONAVIRUS RNA TARGET · 2 APPLICATIONS

1 What they protect

Two applications, assigned to Howard, on treating and detecting coronavirus by targeting a stretch of its RNA: one by Ullah alone, one with Saadyah Averick on a targeted oligo.

2 What it could make possible PATENT ANALYSIS

Treatments and tests aimed at the 5′-poly(U) stretch of the virus's negative-strand RNA, a sequence absent from human cells.

WO2025226671A1 · Application

THE ACTIVE-INFECTION TEST · 1 APPLICATION

1 What they protect

An international application with Darnell Davis, assigned to Howard, on rapid lateral-flow detection of actively replicating coronavirus infection.

2 What it could make possible PATENT ANALYSIS

A quick strip test that tells an active, replicating infection from leftover viral fragments, using CRISPR-Cas13a to spot negative-sense RNA.

3 Who it serves PATENT ANALYSIS

Clinicians and public-health teams deciding on isolation and treatment.

The PI · Research Lean Canvas

Read left to right: the need, the work, the path.

CENTRAL QUESTION

How do signalling hubs (first plant G proteins, now their structural cousin RACK1) integrate a cell's growth and stress signals, and can molecules aimed at those hubs tune them in crops, viral infection and cancer?

THE NEED

THE PROBLEM
Crops failing in salty soil

WHO HAS IT
Rice growers on salt-affected land

WHAT CHANGES
Crops that stay green under salt

THE WORK

WHAT THEY KNOW
How plant cells read the signals that tell them to grow

WHAT THEY CAN DO
Seeing a protein's exact 3D shape

PROOF SO FAR
A switch that tells plant cells to divide

THE PATH

PATHS TO IMPACT
Research papers

TEAM & PARTNERS
A chemistry partner at Georgetown

HOW IT'S SUSTAINED
Federal science funding

UNFAIR ADVANTAGE
A career-long line from G proteins to RACK1

How do signalling hubs (first plant G proteins, now their structural cousin RACK1) integrate a cell's growth and stress signals, and can molecules aimed at those hubs tune them in crops, viral infection and cancer?

Who has the problem.

WHO HAS IT

THE NEED

1 Rice growers on salt-affected land

The salinity work is framed around reducing salt's yield penalty on cereal crops such as rice under climate change.

2 Growers looking for a root booster

The auxin-stimulating compound is described as having potential as a root-inducing bio-stimulant.

3 People with viral infections, and the drug makers treating them

The RACK1 compounds are positioned as host-targeted, broad antiviral candidates for the many viruses that use IRES-based translation.

4 Clinicians and public-health teams deciding on quarantine

Tests that tell replicating from non-replicating virus are framed as a guide to quarantine and treatment decisions.

5 People with cancers that RACK1 helps spread

A patent application covers the compounds for cancers in which RACK1 positively regulates cell migration.

What changes if it works.

WHAT CHANGES

THE NEED

1 **Crops that stay green under salt** PEER-REVIEWED

Boosting RACK1B kept rice leaves green and delayed senescence under salinity.

2 **Antivirals that viruses can't easily outrun** PREPRINT

Aiming at the host protein rather than the virus could reach many viruses; the same compounds cut HIV-1 and hepatitis C reporter activity in cells.

3 **A test strip that shows whether an infection is still active** PREPRINT

A CRISPR lateral-flow prototype, built with Princeton, that detects only replicating coronavirus.

4 **Drugs aimed at a part of the virus that new variants keep** PREPRINT

A designed DNA strand against the conserved 5′-polyU tract stopped infectious mouse coronavirus forming in cells.

5 **Slowing cancer's spread** PREPRINT

RACK1 inhibitors cut migration and invasion of two breast-cancer cell lines in the lab.

What the PI knows.

WHAT THEY KNOW

THE WORK

1 How plant cells read the signals that tell them to grow

Plant heterotrimeric G-protein signalling: his doctoral work showed how G-protein subunits control cell division, seed germination and guard cells.

2 RACK1, a switchboard protein that routes a cell's messages

RACK1 scaffold-protein signal transduction: a structural cousin of the G-protein beta subunit that integrates signals from several pathways.

3 Working out a protein's 3D shape to see how it works

Structural biology of WD40 β-propeller proteins, including the first crystal structure of any RACK1 protein.

4 How crops cope with salt and respond to their own hormones

Plant abiotic stress and hormone signalling (salt, ABA, auxin, gibberellin) in Arabidopsis and rice.

5 Fighting viruses by targeting what they borrow from us

Host-targeted antivirals and RNA-virus diagnostics.

What the lab can do.

WHAT THEY CAN DO

1 / 2

1 Seeing a protein's exact 3D shape

X-ray crystallography: solved Arabidopsis RACK1A at 2.4 Å, the first RACK1 structure.

2 Finding which proteins work together

Split-ubiquitin cDNA library screening, which found 97 potential RACK1A partners.

3 Flipping a protein's on/off switches to test what they do

Site-directed mutagenesis of phosphorylation sites, with stress-assay readouts.

4 Growing plants with one gene removed or boosted

Knockout and activation-tagged transgenic lines in Arabidopsis and rice.

5 Designing small molecules that fit a protein's working spot

Structure-based small-molecule design and binding validation, with Georgetown.

6 Testing treatments in infected and cancer cells

Antiviral assays (herpes simplex, HIV-1, mouse coronavirus) and migration and invasion assays in breast-cancer cells.

What the lab can do.

WHAT THEY CAN DO

2 / 2

7 **Building tests that show whether an infection is still active**

Strand-specific RNA detection and a CRISPR lateral-flow prototype, with Princeton.

The proof so far.

PROOF SO FAR

1 / 2

1 A switch that tells plant cells to divide PEER-REVIEWED

The G-protein alpha subunit GPA1 positively modulates cell division (Science, 2001; 374 citations per OpenAlex as of 29 Oct 2026).

2 The same switch helps plants hold on to water PEER-REVIEWED

GPA1 is needed for ABA regulation of guard-cell ion channels (Science, 2001; 513 citations per OpenAlex as of 29 Oct 2026).

3 A brake on hormone-driven cell division PEER-REVIEWED

The G-protein beta subunit negatively regulates auxin-induced cell division (The Plant Cell, 2003).

4 The first 3D picture of RACK1 PEER-REVIEWED

The first crystal structure of any RACK1 protein, Arabidopsis RACK1A at 2.4 Å (2008).

5 A map of 97 possible partners for RACK1 PEER-REVIEWED

Potential RACK1A interactors across dehydration, salt-stress, ribosomal and photosynthesis pathways.

The proof so far.

PROOF SO FAR

2 / 2

6 Lab-made molecules that stop herpes about as well as the standard drug

PEER-REVIEWED

RACK1-targeting compounds inhibit HSV-1 with efficacy similar to acyclovir in cells, and more strongly in combination.

7 Rice that stays green in salty soil PEER-REVIEWED

OsRACK1B gain of function gives a stay-green phenotype under salinity and delays senescence.

How the work reaches people.

PATHS TO IMPACT

THE PATH

1 Research papers

Published across plant and biomedical science, from Science and PNAS to Frontiers in Plant Science and Oncotarget.

2 Patents with Georgetown

Justia lists patents granted to Ullah and Dakshanamurthy, jointly assigned to Howard and Georgetown, from 2023 to 2026; a separate application covers the cancer-migration compounds.

3 Sharing results early

The coronavirus, HIV/HCV and breast-cancer results are posted as preprints on bioRxiv and Preprints.org.

4 Teaching through research

Undergraduates co-author phage genome papers; a national genomics research course; RUBY genome-editing teaching tools.

5 Opening plant science to more people

An outreach roadmap for plant science and an HBCU exhibit recognising pioneering Black plant scientists.

Who it's done with.

TEAM & PARTNERS

THE PATH

1 A chemistry partner at Georgetown

Sivanesan Dakshanamurthy, on the RACK1 compounds, the antiviral and cancer work and the joint patents.

2 Virology colleagues at Howard

Qiyi Tang on Zika, herpes and mouse coronavirus; Sergei Nekhai on HIV-1.

3 A diagnostics partner at Princeton

Cameron Myhrvold's group, on the CRISPR lateral-flow test.

4 The mentors who trained him

Alan Jones and Jin-Gui Chen at UNC Chapel Hill; David Armstrong's Membrane Signaling Group at NIEHS.

5 Student researchers

Darnell Davis is first author on the active-infection test preprints; undergraduates co-author the phage genome papers.

How it's sustained.

HOW IT'S SUSTAINED

THE PATH

1 Federal science funding

NIH (including NIMHD, NIAID and NCI) and the National Science Foundation, acknowledged on his papers.

2 A science philanthropy

HHMI supports the Howard SEA-PHAGES papers.

3 Defense and AIDS research funding

The HIV-1 preprint acknowledges the Department of Defense and the DC Center for AIDS Research.

What no one else has.

UNFAIR ADVANTAGE

THE PATH

1 A career-long line from G proteins to RACK1

He solved the first RACK1 structure and co-invented compounds against it with Georgetown, then carried them into crops, viruses and cancer cells.

Evidence Base · The Record

Publication record · as of 2026-10-29.

15

h-index

OpenAlex · as of 2026-10-29

18

i10-index

OpenAlex · as of 2026-10-29

1

2-year mean citedness

OpenAlex · as of 2026-10-29

44

Works

OpenAlex · as of 2026-10-29

2,128

Total citations

OpenAlex · as of 2026-10-29

TRAJECTORY

Publication record: 39 approved papers, 2001–2025

2001–2008: Arabidopsis, Arabidopsis Proteins, Signal Transduction (9 papers)

2009–2016: Arabidopsis, Arabidopsis Proteins, Receptors for Activated C Kinase (7 papers)

2017–2025: Signal Transduction, SARS-CoV-2 and COVID-19 Research, Arabidopsis (23 papers)

Emerging since 2017: SARS-CoV-2 and COVID-19 Research, Animal Virus Infections Studies, interferon and immune responses

Earlier focus, not seen after 2008: GTP-Binding Protein alpha Subunits, Heterotrimeric GTP-Binding Proteins, Mutation

Evidence Base · The Field

Publication record · as of 2026-10-29.

TOPIC CLUSTERS

Arabidopsis — 9 papers (2001–2021)

Arabidopsis Proteins — 9 papers (2001–2021)

Signal Transduction — 9 papers (2001–2022)

Receptors for Activated C Kinase — 5 papers (2008–2021)

Gene Expression Regulation, Plant — 4 papers (2003–2022)

GTP-Binding Protein alpha Subunits — 4 papers (2001–2003)

Evidence Base · The Network

Publication record · as of 2026-10-29.

COLLABORATION NETWORK

257 distinct co-authors across 39 papers; 112 identified by ORCID

Recurring collaborator: Alan M. Jones (ORCID 0000-0002-2365-6462) — 5 shared papers

Recurring collaborator: Chen JG (ORCID 0000-0002-1752-4201) — 5 shared papers

Recurring collaborator: Allen AD (ORCID 0000-0002-8952-7233) — 4 shared papers

Recurring collaborator: Dakshanamurthy S (ORCID 0000-0003-3681-4121) — 4 shared papers

Recurring collaborator: Fernando LM — 4 shared papers

Co-authors from 62 other institutions beyond Howard University; most frequent: Georgetown University Medical Center (4 papers), Alabama A&M University (3…

Evidence Base · The Funding

Publication record · as of 2026-10-29.

FUNDING PROFILE

National Institutes of Health — acknowledged on 5 papers (2006–2023)

National Science Foundation — acknowledged on 5 papers (2002–2023)

NIMHD NIH HHS — acknowledged on 5 papers (2019–2022)

Howard Hughes Medical Institute (HHMI) — acknowledged on 3 papers (2021–2023)

National Cancer Institute — acknowledged on 2 papers (2003–2021)

Sources · 1 / 6

Every claim on the preceding cards traces to one of these.

SOURCES

1. Howard University Faculty Profile - Hemayet Ullah — https://profiles.howard.edu/hemayet-ullah
2. Modulation of Cell Proliferation by Heterotrimeric G Protein in Arabidopsis — Science (2001) — https://pubmed.ncbi.nlm.nih.gov/11408654/
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